DU PONT PLANTS EFFLUENT DISPERSION IN DELAWARE RIVER

Hydraulic Model Investigation

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PREFACE

The E. I. du Pont de Nemours and Company, Engineering Department, Wilmington 98, Delaware, requested the Waterways Experiment Station to conduct the studies reported herein in a letter dated 22 May 1956. The studies were conducted on the existing Delaware River model, and authority to perform the tests was granted by the Philadelphia District, CE, and by the Office, Chief of Engineers. The du Pont Company paid all costs in connection with the model study and with the preparation and publication of this report.

The study was conducted in the Estuaries Section of the Hydraulics Division of the Waterways Experiment Station during the period 24 September-1 November 1956. Engineers of the Waterways Experiment Station actively connected with the study were Messrs. E. P. Fortson, Jr., Chief of Hydraulics Division, G. B. Fenwick, Chief of the Rivers and Harbors Branch, H. B. Simmons, Chief of the Estuaries Section, W. H. Bobb, Project Chief of the model, and C. J. Huval. Mr. L. L. Falk of the du Pont Engineering Department was present for and actively assisted in the prosecution of the tests.

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PART I: INTRODUCTION

The Problem, and Purpose of Tests

1. Deepwater Point and Carneys Point Plants of the du Pont Company, located on the New Jersey shore of the Delaware River east of Wilmington (see plate 1), are presently discharging high-acidity, high-density by-products from two retention basins through tide-controlled sluice gates into the Delaware River. The sluice gates open during times of ebbing currents and close during times of flooding currents. The gate for the Deepwater Point Plant is located at the mouth of Whopping John Creek and the gate for the Carneys Point Plant is located at the mouth of Bcuttown Creek as shown on plate 2. Currents adjacent to the shore line in the vicinity of the discharge points are low, and the plant effluents are not being rapidly and efficiently dispersed throughout the river water passing the plants. Effluent concentrations in all small embayments and pockets along the New Jersey shore are at times higher in the vicinity of the plants than elsewhere along the shore line.

2. To alleviate this situation it was proposed that the present method of releasing effluent intermittently through the two tidal sluice gates be changed to a continuous release method utilizing pipes extending into the river along the channel bottom. The primary purpose of the model tests was to determine what benefits, in the way of more rapid dispersion of effluents and elimination of areas of high concentration, could be expected from the proposed changes. It was further desired to determine the minimum length of discharge line that would be required for each plant in order to insure adequate mixing of plant effluent and river water. In addition, tests were made to determine the effects of two proposed plans for altering (straightening) the shore line between Deepwater and Carneys Points (as shown on plate 2) on effluent dispersion

and distribution. The probable effects on effluent dispersion of dredging a proposed anchorage adjacent to the plants to -40 ft mlw within the limits shown on plate 2 were also investigated.

3. The purpose of the shore line alterations being considered by the du Pont Company is to control shore erosion. Definite conclusions concerning the effects of these alterations on shore erosion cannot be derived from tests in a model built to as small a scale as the one used in this study. However, certain effects of the changes in shore line features on the hydraulics of the river may have a bearing on shore erosion, and these effects are shown correctly by the model.

Improvements Tested

4. The proposed pipelines to replace the sluice gates are to extend from the shore perpendicular to channel center-line stations 168+000 and 178+000 as located on plate 2. At the Deepwater Point Plant, opposite channel station 178+000, four lengths of 5-ft-diam discharge line, i.e., discharge line extending 0 ft, 400 ft, 550 ft, and 650 ft from the shore, were studied. At Carneys Point Plant, opposite channel station 168+000, three lengths of 1-ft-diam discharge line -- 1200 ft, 1500 ft, and 2000 ft -- were studied.

5. Three shore-line conditions were investigated during the study and are designated as the existing shore line, and plans 1 and 2, all of which are shown on plate 2. The existing shore line is the unimproved 1954 shore line in the vicinity of the two plants. Plan 1 consists of the minimum alteration required to straighten the existing shore line for about a mile downstream from the Carneys Point Plant, and in addition it extends into and contains approximately one-third of Helms Cove. The plan 2 shore line is approximately parallel to and 1000 ft from the existing shore line in the vicinity of the Carneys Point Plant. A diked channel for the discharge from Whopping John Creek is provided, and the plan 2 shore line also extends into Helms Cove as does plan 1.

6. The proposed Deepwater Point anchorage, to be dredged by the Corps of Engineers, has an approved project depth of -40 ft mlw within the limits shown on plate 2.

PART II: THE MODEL AND ITS VERIFICATION FOR THESE TESTS

7. The tests were conducted in an existing model of the Delaware River, limits of which are shown on plate 1. The model and appurtenances, and its adjustment and verification are described in Waterways Experiment Station Technical Memorandum 2-337, Report 1, Delaware River Model Study, Hydraulic and Salinity Verification, May 1956, and are not repeated in this report. The referenced report also discusses the model-to-prototype scale relationships for time, velocity, discharge, etc., which are derived by the Froudian scale relationship. The horizontal scale of the model is 1:1000 and the vertical scale is 1:100. The scale relationship for simulation of concentrations and density of the plant effluent, applicable to the results of tests reported herein, is 1:1.

8. Although the over-all model was in adjustment to the prototype, it was necessary to verify its correct simulation of local hydraulic conditions in the problem area. For this purpose, prototype velocity data were gathered at three stations designated X, Y, and Z on plate 2. Averages of comparable model and prototype current velocities at these velocity stations are shown on plate 3. These plots indicate that the model reproduction of current velocities in the problem area was very good.

9. Additional observations of prototype surface currents were made by means of floats released and tracked through the prototype problem area. Duplicate releases with respect to both time of tide and location of release points of floats were made in the model in order to learn whether the model simulated all conditions as observed in the prototype. Comparisons of model and prototype data showed that both the directions and velocities of surface currents in the problem area were reproduced with sufficient accuracy; however, these data are omitted from this report for reasons of economy.

PART III: TESTS

Test Procedures and Types of Data Obtained

10. In order to insure the best reproduction of effluent dispersion under various conditions, testing techniques were designed to simulate all possible prototype features as closely as possible. The initial acidity of the effluent was simulated by use of methylene blue chloride dye, and the prototype effluent conditions of discharge, specific gravity, and initial concentration were scaled to the correct model values. Pipeline discharge from the Carneys Point Plant was regulated by a small variable speed pump, while the Deepwater Plant discharge was released manually from an 8- by 1-ft graduated cylinder containing the stock solution of the effluent. The specific gravity of the effluent was adjusted to the desired value by the addition of sodium chloride. Difficulties in obtaining the initial effluent conditions were experienced during the testing program, and adjustments of test results, as explained later, were necessary to insure comparability of values.

11. The concentration of dye was determined photometrically using a Beckman model DU spectrophotometer. The spectrophotometer used measures light transmission (or extinction) through a 1-cm sample path at the characteristic wave length of the dye. The spectrophotometer response is calibrated in terms of dye concentrations in parts per million. Water samples were obtained from several locations throughout the model prior to starting release of the plant effluent, and these samples were analyzed to determine the normal turbidity of the model water. The average value of these turbidity samples taken throughout the testing program was 0.06 ppm, and since this value was so small and little difference in turbidity was noted between tests, no correction for normal turbidity was made.

12. In each test samples were taken at middepth, mid-channel approximately every fifth tidal cycle at times of both high- and low-water slack of the current until approximate stability of the dispersed effluent (dye) upstream from the problem area was reached. Samples were then taken

in the problem area at a number of sampling stations during the final three or four tidal cycles for the purpose, in most cases, of either locating the places and times of maximum concentrations or verifying the absence of high concentrations. One set of final mid-channel samples was taken at both high- and low-water slack after the local samples had been obtained.

13. As a further aid in determining the local effluent distribution, photographic color transparencies of the problem area were taken at hourly intervals for the first tidal cycle and usually for half of the second tidal cycle for all tests. In addition, color motion pictures of initial effluent dispersion in the problem area were made for tests 3, 5, 14, and 16. The color transparencies provided an excellent record of initial dispersion patterns, and were used extensively in the preparation of this report; however, the cost of reproducing them made their inclusion in this report impracticable.

14. At the beginning of each test, samples were taken from near the surfaces and from the bottoms of the tubes containing the supplies of effluent for the entire test. In addition, similar samples were taken at intervals throughout the test. When these samples were analyzed, it was found that in most cases the actual concentration of the dye differed somewhat from the desired concentration. In order to directly compare the results of one test to those of another, it was necessary to adjust the data by the ratio of the desired dye concentration to the actual dye concentration. This correction factor used for adjustment of test data was arrived at by obtaining the arithmetic mean of all values of the effluent concentration obtained during the test and dividing this value into the desired dye concentration. The results of tests involving a discharge from both plants were adjusted by a factor representing the sum of the desired dye concentrations divided by the sum of actual dye concentrations. The correction factors computed from each test are tabulated on the following page for the convenience of the reader.

Test Number	Correction Factor	Test Number	Correction Factor
3	1.126	11	1.254
4	1.418	12	1.509
5	1.465	13	1.235
6	1.646	14	1.987
7	1.231	15	1.148
8	1.058	16	1.214
9	4.211	17	1.004
10	1.208	18	1.156

15. In all tests mean tidal conditions were reproduced and effluent release was not started until salinity and tidal conditions were known to be stable. Fresh-water discharge conditions were simulated by introducing the required flows for the discharge to be reproduced into the model at the various inflow points shown on plate 1.

Preliminary Tests

16. Tests 1 and 2 were trial tests to determine the best locations for sampling stations, the workability of testing and sampling techniques etc., and no detailed results of these tests are included in this report. However, their results indicated that the optimum length of discharge line for each plant could best be determined from individual tests during which only one plant discharge would be simulated, following which the discharge of both plants should be reproduced, using the optimum discharge line length for each, to determine the effects of shore-line changes, fresh-water discharge, and effluent density on effluent dispersion.

Base Tests

17. In model investigations, tests of existing prototype conditions, referred to as base tests, are made to provide a direct basis for evaluating the results of subsequent tests incorporating proposed improvement plans. Since the effluent dispersion from each plant was first to be studied separately, it was necessary to establish corresponding base conditions. First a test of existing (or base) conditions with only the

discharge of the Deepwater Point Plant sluice gate simulated was conducted and designated test 3. Then a base test for conditions with only the Carneys Point Plant sluice gate discharging was conducted and designated test 4. Finally a base test, test 5, of conditions representing both sluice gates discharging was conducted. Mean fresh-water discharge conditions (16,475 cfs at and including the Schuylkill River) were simulated in all the base tests, and shore-line conditions as observed in 1954 were used throughout the problem area. Test conditions are summarized in table 1.

18. In test 3, the Deepwater Point Plant effluent was released at the rate of 150,000 gal per min for the 6-hr interval between the hours* of 1.5 and 7.5, which included most of the ebb portion of the tidal cycle. The release point was at the mouth of Whopping John Creek, as shown on plate 2. The model was operated for 15 stability cycles prior to beginning release of the effluent, and operation was continued for 45 tidal cycles after effluent release was started. Samples for spectrophotometer analysis to determine the initial turbidity were obtained prior to starting the effluent release. Samples were obtained at middepth, mid-channel at five-cycle intervals, starting with cycle 5 and ending with cycle 45, at selected channel stations at times of local high- and low-water slack. The adjusted results of these samplings are contained in table 2. During cycles 42-44, samples were obtained at various times throughout the cycle at eight of the sampling stations shown on plate 2, and the adjusted results of these samplings are presented in table 3.

19. In test 4 the simulated Carneys Point Plant effluent was introduced at the mouth of Bouttown Creek during the 3-hr interval between hours 1.5 and 4.5 at the rate of 15,700 gal per min for 27 tidal cycles. This test was conducted in a manner identical to test 3 and the results of samplings made during this test are presented in tables 2 and 3.

20. The conditions for tests 3 and 4 were combined for test 5.

* All time references in this report refer to cycle zero, which is the cycle during which effluent release was started. Hour 0.0 is the time of the moon's transit of the 75th meridian.

The results of samplings made during this test are also included in tables 2 and 3.

Tests of Improvement Plans

21. Table 1 summarizes the test conditions for all tests conducted. It is apparent from this table that test 3 was the base test for tests 6, 7, 8, 12, and 13 in all of which only the Deepwater Point Plant was discharging and effluent outfall, shore-line, and anchorage conditions were varied. Test 4 was the base test for tests 9, 10, and 11 which involved only the Carneys Point Plant discharge and in which the outfall location and type of effluent release were varied. Test 5 was the base test for test 14 which combined the plan 1 shore line with the optimum lengths of discharge line for the two plants as had been determined from the individual tests with only one plant discharging. Test 14 was in turn the base test for evaluating the effects of fresh-water discharge (tests 15 and 16), the effects of the plan 2 shore line as compared to plan 1 (test 17), and the effects of reducing the specific gravity of the plant effluents (test 18).

PART IV: TEST RESULTS

Individual Tests of Deepwater Point Plant Discharge

Optimum pipeline length

22. Comparison of results of test 6 with those of test 3 shows the effects on effluent dispersion of changing from the intermittent type release used at present to a continuous release at the shore, while comparison of the results of tests 8, 12, and 13 with those of test 6 shows the effects of extending the discharge line various distances into the river. The outfall points for all these tests were located on a line perpendicular to the channel center line at channel station 178+000, and the volume of effluent discharged during each tidal cycle for all tests was approximately equal. The distance between the shore and the outfall point, and the depth of pipe invert simulated for each test are shown in table 1, and the effluent discharge points or outfalls are located on plate 2. The results of all of these tests are presented in tables 2 and 3.

23. The effects of the pipeline lengths used in these tests on effluent distribution are shown graphically on plate 4, which presents the final concentrations observed at times of high- and low-water slack along the center line of the navigation channel. The maximum effect of discharge line length was noted when the outfall was located 400 ft from the shore line (test 12). Additional lengths of pipeline beyond 400 ft appeared to offer little benefit in decreasing concentrations in the immediate vicinity of the plant or in the channel proper with the exception of concentrations at the cable tower (point M, plate 2).

24. Close examination of plate 4 shows that the results of test 13, outfall 550 ft from shore, do not fall between the results of tests 8 and 12 in which the outfalls were located 650 and 400 ft from shore, respectively, as would normally be expected. As an indication of the probable validity of test 13, plots of dye concentration vs time (as represented by tidal cycles after release of effluent) for tests in this series were prepared from the mid-channel observations at station

170+000. These plots are shown on plate 5 and indicate that effluent concentrations were extremely erratic at the time the final observations for test 13 were made, and this is attributed to the fact that the effluent injection apparatus failed temporarily shortly after cycle 20. After the apparatus was repaired, the effluent was released at approximately double the normal rate until the deficiency in total dye required was corrected. Operation time was not sufficient to permit proper mixing of the effluent introduced at the high rate prior to obtaining the final samples. This should be kept in mind in evaluating the results of test 13.

25. The plots of effluent concentration vs time were found to be very valuable in determining whether or not effluent concentrations in the problem area were stable when the final observations were made. Examination of the plots for tests 6, 8, 12, and 13 show that conditions were essentially stable for tests 8 and 12, concentrations were still increasing for test 6, and concentrations were very erratic for test 13. In the case of test 6, the greater length of time required for stability of effluent concentrations appears to be attributable to location of the outfall at the shore. The much lower velocities near the shore required an appreciably longer time to effectively disperse the contaminant over the entire width of the river.

26. The results of observations made at the end of each test at various times throughout a tidal cycle are recorded in table 3. All samples were taken at middepth unless otherwise noted. The maximum value observed during a cycle was recorded at the location of each sampling station on a map, and the 5-ppm, 10-ppm, and 50-ppm contours were drawn with the assistance of the color transparencies. Such plots for tests 3, 6, 8, 12, and 13 are shown on plates 6-10, respectively. Comparisons of these plates show that changing from the existing disposal system to the continuous discharge at the shore (test 3 and test 6) greatly reduced the size of the area of highest concentration (50 ppm) but had little effect on the size of the areas of lower concentration (10 and 5 ppm). The change from the continuous discharge at the shore to a point 400 ft from shore (tests 6 and 12) greatly reduced the

size of the areas of all concentrations. Further extension of the discharge line into the river (tests 8 and 13) did not further reduce the size of the areas of contamination.

27. In order to determine the effect of pipeline length on concentrations throughout a tidal cycle at critical locations in the problem area (stations N, M, and L, plate 2), the values obtained from observations made at these locations throughout a tidal cycle were plotted vs time and are shown on plate 11. (These data are also included in table 3.) Extensions of the outfall point 400 ft from the shore toward the channel caused a reduction in dye concentration throughout the tidal cycle at all three critical locations. Maximum concentrations at location N, under the Delaware Memorial Bridge, were decreased from about 6 ppm to about 2 ppm. Maximum concentrations at station M, located adjacent to the submarine power cable tower, were reduced from about 8.2 ppm to about 4.6 ppm; while maximum concentration at station L, located near the shore upstream from the outfall point, were reduced from about 6.4 to about 2.5 ppm. Shifting the outfall to a point 650 ft from the shore further reduced the maximum concentration at location M to 1.4 ppm with little effect elsewhere.

Effects of proposed anchorage

28. Conditions for tests 7 and 8 were identical except that the proposed Deepwater Point anchorage dredged to -40 mlw within the limits shown on plate 2 was included in test 7. Comparisons of the results of these tests are shown on plates 5 and 12. Contours of the maximum observed concentrations for tests 7 and 8 are shown on plates 13 and 8, respectively. These data indicate that dredging the anchorage would have no significant effect on effluent distribution in the problem area.

Individual Tests of Carneys Point Plant Discharge

29. The complete results of the tests of plans 9, 10, and 11 are given in tables 2 and 3. Plate 14 includes a plot of the effluent concentrations vs time at channel station 170+000 throughout each of these tests. At the end of tests 10 and 11, concentrations were p[illegible]tically

size of the areas of all concentrations. Further extension of the discharge line into the river (tests 8 and 13) did not further reduce the size of the areas of contamination.

27. In order to determine the effect of pipeline length on concentrations throughout a tidal cycle at critical locations in the problem area (stations N, M, and L, plate 2), the values obtained from observations made at these locations throughout a tidal cycle were plotted vs time and are shown on plate 11. (These data are also included in table 3.) Extensions of the outfall point 400 ft from the shore toward the channel caused a reduction in dye concentration throughout the tidal cycle at all three critical locations. Maximum concentrations at location N, under the Delaware Memorial Bridge, were decreased from about 6 ppm to about 2 ppm. Maximum concentrations at station M, located adjacent to the submarine power cable tower, were reduced from about 8.2 ppm to about 4.6 ppm; while maximum concentration at station L, located near the shore upstream from the outfall point, were reduced from about 6.4 to about 2.5 ppm. Shifting the outfall to a point 650 ft from the shore further reduced the maximum concentration at location M to 1.4 ppm with little effect elsewhere.

Effects of proposed anchorage

28. Conditions for tests 7 and 8 were identical except that the proposed Deepwater Point anchorage dredged to -40 mlw within the limits shown on plate 2 was included in test 7. Comparisons of the results of these tests are shown on plates 5 and 12. Contours of the maximum observed concentrations for tests 7 and 8 are shown on plates 13 and 8, respectively. These data indicate that dredging the anchorage would have no significant effect on effluent distribution in the problem area.

Individual Tests of Carneys Point Plant Discharge

29. The complete results of the tests of plans 9, 10, and 11 are given in tables 2 and 3. Plate 14 includes a plot of the effluent concentrations vs time at channel station 170+000 throughout each of these tests. At the end of tests 10 and 11, concentrations were practically

the effluent. The complete results of tests 5 (base test) and 14 are included in tables 2 and 3. Comparative curves of the effluent concentrations vs time at channel station 170+000 for tests 5 and 14 are shown on plate 21. It is apparent that stability from the standpoint of dye concentration was not reached by the end of either test. Test 14 was continued for 47 tidal cycles, and it does not appear that the ultimate maximum values would greatly exceed the final observed values for this test. All corresponding values would be considerably lower than values determined for base or test 5 conditions. The high- and low-water slack dye concentration profiles along the channel center line for both tests are shown on plate 22 for comparison. Dye concentrations upstream from the outfall points are considerably higher for test 5 than for test 14. The effect of changing from sluice gate to pipeline on local concentrations throughout a tidal cycle at stations N, K, and D (located as shown on plate 2) are shown on plate 23. These comparative curves show that local concentrations were reduced at all three locations. The maximum concentration contours, shown on plate 24 for test 5 and on plate 25 for test 14, clearly show the advantages of moving the outfall points away from shore and changing to a continuous-type discharge. The areas where concentrations exceed 50 ppm are practically eliminated, and the areas where concentrations exceed 10 ppm are greatly reduced and moved away from shore. Concentrations exceeding 5 ppm were eliminated along the shore upstream from Deepwater Point. It is pointed out that at almost all stations where concentrations exceeding 5 ppm were observed, the sample was obtained from the bottom. Surface samples at the same stations showed lesser concentrations.

Effects of fresh-water discharge

31. Results of tests 15 and 16 made to determine the effects of fresh-water discharges of 32,950 and 5,000 cfs, at and including the Schuylkill, should be compared to the results of test 14 which was made for similar conditions with a mean fresh-water discharge of 16,475 cfs. The complete results of these tests are included in tables 2 and 3. Effluent concentrations at channel station 170+000, plotted against . .

time in tidal cycles for tests 14, 15, and 16, are shown on plate 21. The results of test 15 with the high discharge indicate that dye conditions had become stable prior to termination of the test. Dye conditions were practically stable by the end of test 14 as has been previously stated, and only small increases in maximum concentrations could be expected upstream from station 170+000 had model operation been continued until stability was reached. Dye conditions were in a very transient state and were still rapidly increasing at the end of test 16, which was made for the low fresh-water discharge. Subsequent tests involving dye releases at other locations under low discharges indicated that model operation for some 70 to 80 tidal cycles is necessary to obtain stable dye conditions for a discharge equivalent to 5000 cfs, at and including the Schuylkill. It is evident that stable maximum values for the low discharge would greatly exceed corresponding values for the high discharge at and upstream from station 170+000. It is believed that stable maximum values for a mean discharge (test 14) would have been exceeded had test 16 been continued until stability of dye conditions had been reached.

32. The mid-channel dye concentration profiles for high- and low-water slack times for the three tests are shown on plate 26. The progressive movement of the effluent upstream as the fresh-water discharge is decreased is clearly illustrated. The difference between the results of test 16 for the low discharge and the results of the other two tests would have been much greater had test 16 been continued until stable dye conditions had been reached.

33. The contours of maximum concentrations at the end of tests 14, 15, and 16 are shown on plates 25, 27, and 28, respectively. Comparison of plates 25 and 27 shows that doubling the discharge (from 16,475 to 32,950 cfs) greatly reduced values at all locations. Plate 28, showing the results of final observations for test 16, is included, but it should be noted that stability of dye conditions had not been reached. Values were still low, since the dye was still being transported in an upstream direction at the end of the test.

Effects of plan 2 shore line

34. The conditions for test 17 were the same as described for test 14, except that for test 17 the shore line between Deepwater Point and Carneys Point was revised to conform to the plan 2 shore line (see plate 2). Effluent concentrations at station 170+000 throughout each of the tests are shown on plate 29. Values for test 17 were initially lower than corresponding values for test 14, and this condition still existed at the end of test 17, at which time dye conditions could not be considered to be stable. The low initial concentrations observed during test 17 are attributed in part to the fact that the initial dye concentration of the Carneys Point Plant effluent was only 75 per cent of the desired concentration. This was discovered and corrected by changing the effluent supply during the ninth tidal cycle. The exact over-all effect of this dye deficiency cannot be computed from available data. The profiles of dye concentration along the channel center line at the end of both tests are shown on plate 30. Values for test 17 are much lower than corresponding values for test 14. It is not believed that the change in shore line produced such a drastic change in the dye distribution throughout the problem area as is indicated by the results plotted on plates 29 and 30. The decrease in dye concentration in the problem area should have been accompanied by an increase in dye concentration elsewhere if the total volume introduced is the same. Since such an increase was not apparent, the results are evidently affected to some degree by the deficiency in total dye introduced caused by the low initial concentration of the Carneys Point effluent. Time-exposure photographs of confetti being transported on the water surface at time of maximum currents were made for base, plan 1, and plan 2 conditions with the mean fresh-water discharge. Similar photographs were made with the proposed anchorage dredged in the model. Examination and comparison of photographs 1, 2, and 3, showing surface-current directions at strengths of flood and ebb for base, plan 1, and plan 2 conditions, respectively, show the progressive elimination of shore-line eddies, first as the plan 1 shore line was installed, and then as the change to the plan 2 shore line was made.

The flood-tide eddy area upstream from Deepwater Point was completely eliminated by the plan 2 shore line and ebbing currents were also brought into excellent alignment in the vicinity of the two outfall points. Similar effects may be noted on photographs 4-6, which show current directions for the base test and plan 1 and plan 2 shore lines with the anchorage dredged. Apparently the plan 2 shore line also caused an increase in velocities at the outfall points accompanied by increased turbulence and more rapid mixing and dispersion of the dye. These factors would result in values of dye concentrations for test 17 being lower than corresponding values for test 14. However, it does not seem likely that the large difference indicated by comparison of the curves on plate 30 would be caused by the shore-line change alone. The contours of maximum concentrations at the end of tests 14 and 17 are shown on plates 25 and 31.

Effects of decreasing the density of the plant effluents

35. The conditions of test 14 were repeated for test 18 except that the salinity of the effluent was reduced to the mean density observed in the problem area. The complete results of test 18 are included in tables 2, 3, and 4. The dye concentrations observed at station 170+000 throughout the test are plotted on plate 29 with those of tests 14 and 17. Conditions at the end of test 18 appear to be fairly stable, and little difference in the rate of increase in dye concentration at station 170+000 is noted between test 17 and test 14. The final profiles of dye concentrations observed along the channel center line for test 18 are shown on plate 30, and no significant difference is apparent between the results of tests 14 and 18. However, comparison of the contours of maximum local concentrations on plate 25 for test 14 and on plate 32 for test 18 indicates that the density decrease resulted in the effluent being retained in the shallow-water areas, or in depths equal to or less than the depth of the outfall. The heavier effluent used for all tests except test 18 had been observed to flow from the outfall point with the slope of the bottom which is generally toward the channel, where higher velocities and increased turbulence existed

and where larger volumes of water for dilution of the effluent were available. This phenomenon was particularly apparent during times of slack current. This resulted in a rapid dispersion rate, accompanied by lesser concentrations locally and in general. The downslope migration of plant effluent did not occur when the density difference between it and river water was reduced to zero. The plant effluent tended to remain in the vicinity of the outfall points in higher concentrations than had been observed for test 14, and the area where concentrations exceeded 5 ppm was greatly increased as a result of decreasing the density of plant effluents.

36. The results of observations made at selected channel stations during the 17th cycle of model operation, after release of the plant effluent was started for test 18, are included in table 4 along with similar observations for tests 15 and 16 which were for conditions of high and low fresh-water discharge, respectively. The test 18 observations at stations 140+000, 170+000, and 225+000 are shown on plate 33 where dye concentrations are plotted against time in hours. The variations in concentrations occurring during a tidal cycle can be seen from an examination of plate 33. Maximum concentrations in the channel, in and upstream from the problem area, occur during the portion of the tidal cycle when currents are flooding as illustrated by observations at stations 140+000 and 170+000. Maximum concentrations downstream at station 225+000 occur during the ebbing portion of the tidal cycle. Data contained in table 4 and on plate 33 do not represent final values but are included to show the variation that can be expected at selected locations within a tidal cycle.

PART V: CONCLUSIONS

37. The following general conclusions have been reached on the basis of results of model tests reported herein.

a. Definite benefits with respect to reductions in maximum concentrations near the shore can be expected as a result of converting the intermittent-sluice-gate type effluent release now being utilized to a continuous-type release from a pipeline extending from the shore toward the channel. The plant effluent would in effect be released in a larger volume of water where better mixing conditions exist with resultant generally lower concentrations throughout the problem area. The tests indicated that the proposed pipelines prevented concentrations in excess of about 5 ppm near the shore and at the surface.

b. The minimum length outfall line for the Deepwater Point Plant, located on the alignment shown on plate 2, to insure a significant reduction in concentrations at the cable tower and at the power plant intake (locations M and P, respectively, on plate 2), is 650 ft. Extension of the Carneys Point outfall beyond 1500 ft does not appear justified; however, test results indicate that no shorter length should be used.

c. Effluent concentrations throughout the problem area will decrease as the fresh-water discharge increases and the reverse will accompany any reductions in fresh-water discharge.

d. The proposed plan 1 and plan 2 revisions to the shore line as shown on plate 2 will cause reductions in local concentrations chiefly because of the elimination of pockets and projections found along the original shore line which tend to trap the effluent in small eddies and create pockets of higher concentrations.

e. No material benefit would be derived from measures taken to reduce the density difference between the plant effluent and the river water. Test results indicated that the heavier effluent moved downslope, particularly near and during times of slack current, which materially aided the dispersion process.

38. It should be pointed out that the above conclusions refer entirely to the effect of the various factors tested on the ability of the model currents to disperse and dilute the dye which was used to simulate

the acidity of the effluent from both the Deepwater Point and Carneys Point Plants. These results must be interpreted by engineers with knowledge of the chemistry involved in the actual dilution process in the prototype and who are aware of the concentrations which can be tolerated at critical locations.

39. Conclusions requested regarding the effect of the plan 1 and plan 2 shore lines on shore erosion cannot be drawn from the results of any of the tests reported herein. Erosion of the shore between the two plant sites probably is not the result primarily of tidal currents but of wash from passing ships. The scale relationships to which the existing Delaware River model is constructed make the analysis of problems of this type impossible.

Table 1

du Pont Effluent Dispersion Tests

Summary of Test Conditions

Test Number	Plants Discharging	Pipeline Outfall Distance Out ft	Pipeline Outfall Depth Invert ft	Shore Line	Anchorage	Fresh-water Discharge cfs	Mode of Effluent Discharge	Start and End of Discharge Tidal Hours	Effluent Discharge gal/min	Effluent Discharge cfs	Effluent Concentration ppm Salt	Effluent Concentration ppm Dye	Effluent Specific Gravity
3	Deepwater Point	-----	--	Existing	Not dredged	16,475	Tidal sluice gate	1.5 to 7.5	150,000	334.0	5,700	278	1.0027
4	Carneys Point	-----	--	Existing	Not dredged	16,475	Tidal sluice gate	1.5 to 4.5	15,700	35.0	4,600	5,100	1.0021
5	Deepwater Point and	-----	--	Existing	Not dredged	16,475	Tidal sluice gate	1.5 to 7.5	150,000	334.0	5,700	278	1.0027
	Carneys Point	-----	--				Tidal sluice gate	1.5 to 4.5	15,700	35.0	4,600	5,100	1.0021
6	Deepwater Point	0	0	Plan 1	Dredged	16,475	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
7	Deepwater Point	650	-20	Plan 1	Dredged	16,475	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
8	Deepwater Point	650	-20	Plan 1	Not dredged	16,475	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
9	Carneys Point	1,500	-19	Plan 1	Not dredged	16,475	Pipeline	Continuous	3,000	6.7	5,700	6,400	1.0027
10	Carneys Point	2,000	-23	Plan 1	Not dredged	16,475	Pipeline	Continuous	3,000	6.7	5,700	6,400	1.0027
11	Carneys Point	1,200	-12	Plan 1	Not dredged	16,475	Pipeline	Continuous	3,000	6.7	5,700	6,400	1.0027
12	Deepwater Point	400	-10	Plan 1	Not dredged	16,475	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
13	Deepwater Point	550	-15	Plan 1	Not dredged	16,475	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
14	Deepwater Point and	650	-20	Plan 1	Not dredged	16,475	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
	Carneys Point	1,500	-19				Pipeline	Continuous	3,000	6.7	5,700	6,400	1.0027
15	Deepwater Point and	650	-20	Plan 1	Not dredged	32,950	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
	Carneys Point	1,500	-19				Pipeline	Continuous	3,000	6.7	5,700	6,400	1.0027
16	Deepwater Point and	650	-20	Plan 1	Not dredged	5,000	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
	Carneys Point	1,500	-19				Pipeline	Continuous	3,000	6.7	5,700	6,400	1.0027
17	Deepwater Point and	650	-20	Plan 2	Not dredged	16,475	Pipeline	Continuous	50,000	111.0	8,100	400	1.0039
	Carneys Point	2,000	-23				Pipeline	Continuous	3,000	6.7	5,700	6,400	1.0027
18	Deepwater Point and	650	-20	Plan 1	Not dredged	16,475	Pipeline	Continuous	50,000	111.0	300	400	1.000
	Carneys Point	1,500	-19				Pipeline	Continuous	3,000	6.7	300	6,400	1.000

Note: See plate 2 for elements of plans and location of outfalls.
Distance out measured perpendicular to channel center line from existing shore line at Deepwater Point Plant and Plan 1 shore line at Carneys Point Plant.
Depths refer to Delaware River datum which is 2.90 ft below mean sea level at Sandy Hook, 1929 adjustment.
Fresh-water discharge referred to is the total fresh-water discharge at and including the Schuylkill River.
Specific gravity of effluent is referred to average specific gravity of river water in the problem area.

Table 2

du Pont Effluent Dispersion Tests

Midchannel Concentrations in ppm

1000-ft Channel Stations	Tidal Cycles after Release																			
	5	6	10	15	20	25	26	27	28	30	31	32	33	35	36	37	39	40	45	47
Test 3																				
High-water Slack Concentration																				
150	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.29	----
155	0.37	----	0.80	1.07	1.10	1.34	----	----	----	1.53	----	----	----	1.64	----	----	----	1.61	1.59	----
160	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.51	----
165	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.62	----
170	0.26	----	0.75	1.02	1.04	1.29	----	----	----	1.47	----	----	----	1.92	----	----	----	1.62	1.65	----
175	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.69	----
180	0.32	----	0.66	0.90	0.89	1.31	----	----	----	1.36	----	----	----	1.50	----	----	----	1.62	1.62	----
185	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.53	----
190	0.16	----	0.47	0.69	0.44	1.02	----	----	----	1.17	----	----	----	1.43	----	----	----	1.40	1.45	----
200	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.33	----
225	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.90	----
250	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.65	----
Low-water Slack Concentration																				
150	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.06	----
155	0.01	----	0.05	0.11	0.05	0.09	----	----	----	0.08	----	----	----	0.09	----	----	----	0.10	0.03	----
160	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.08	----
165	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.12	----
170	0.11	----	0.18	0.27	0.26	0.27	----	----	----	0.27	----	----	----	0.30	----	----	----	0.36	0.33	----
175	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	0.69	----
180	0.39	----	0.64	0.77	0.82	0.30	----	----	----	0.99	----	----	----	0.74	----	----	----	1.00	0.95	----
185	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.20	----
190	0.74	----	0.87	1.05	1.18	1.35	----	----	----	1.36	----	----	----	2.15	----	----	----	1.77	1.58	----
200	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	2.00	----
225	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.73	----
250	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	1.10	----
Test 4																				
High-water Slack Concentration																				
100	----	----	----	0	----	----	----	0.24	----	----	----	----	----	----	----	----	----	----	----	----
110	----	----	----	0.	----	----	----	0.60	----	----	----	----	----	----	----	----	----	----	----	----
120	----	----	----	0.24	----	----	----	0.34	----	----	----	----	----	----	----	----	----	----	----	----
130	0.14	----	0.20	0.23	0.24	----	----	0.30	----	----	----	----	----	----	----	----	----	----	----	----
140	0.24	----	1.15	0.57	0.60	----	----	0.62	----	----	----	----	----	----	----	----	----	----	----	----
145	----	----	0.65	----	0.65	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
150	----	----	----	1.09	----	----	----	1.10	----	----	----	----	----	----	----	----	----	----	----	----
155	0.41	----	0.81	----	1.08	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
160	----	----	----	1.25	----	----	----	1.46	----	----	----	----	----	----	----	----	----	----	----	----
170	0.64	----	1.12	1.40	1.36	----	----	1.62	----	----	----	----	----	----	----	----	----	----	----	----
180	0.48	----	1.13	1.23	1.49	----	----	1.70	----	----	----	----	----	----	----	----	----	----	----	----
195	----	----	----	0.89	----	----	----	1.59	----	----	----	----	----	----	----	----	----	----	----	----
215	----	----	----	0.74	----	----	----	1.64	----	----	----	----	----	----	----	----	----	----	----	----
250	----	----	----	0.24	----	----	----	0.37	----	----	----	----	----	----	----	----	----	----	----	----
Low-water Slack Concentration																				
160	----	----	----	0.07	----	----	----	0.09	----	----	----	----	----	----	----	----	----	----	----	----
170	----	----	----	0.14	----	----	----	0.50	----	----	----	----	----	----	----	----	----	----	----	----
180	----	----	0.33	0.44	0.72	----	----	0.60	----	----	----	----	----	----	----	----	----	----	----	----
185	----	----	----	0.99	----	----	----	0.85	----	----	----	----	----	----	----	----	----	----	----	----
190	0.47	----	0.75	1.67	0.69	----	----	1.18	----	----	----	----	----	----	----	----	----	----	----	----
195	0.43	----	0.82	0.92	1.09	----	----	1.29	----	----	----	----	----	----	----	----	----	----	----	----
200	0.55	----	1.23	1.73	1.80	----	----	1.56	----	----	----	----	----	----	----	----	----	----	----	----
205	0.95	----	1.65	----	1.93	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
210	----	----	----	1.90	----	----	----	1.82	----	----	----	----	----	----	----	----	----	----	----	----
215	----	----	1.25	----	1.65	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
220	----	----	----	1.43	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
225	----	----	----	----	----	----	----	2.03	----	----	----	----	----	----	----	----	----	----	----	----
250	----	----	----	0.44	----	----	----	1.15	----	----	----	----	----	----	----	----	----	----	----	----
275	----	----	----	0.34	----	----	----	0.82	----	----	----	----	----	----	----	----	----	----	----	----
Test 5																				
High-water Slack Concentration																				
120	----	----	----	0.60	----	----	----	0.69	----	----	----	----	----	----	----	----	----	----	----	----
135	----	----	----	2.74	----	----	----	3.06	----	----	----	----	----	----	----	----	----	----	----	----
150	1.39	----	2.35	3.31	2.30	----	----	3.79	----	----	----	----	----	----	----	----	----	----	----	----
160	----	----	----	3.09	----	----	----	3.49	----	----	----	----	----	----	----	----	----	----	----	----
165	1.02	----	2.23	2.92	3.35	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
170	----	----	----	[illegible]	----	----	----	3.54	----	----	----	----	----	----	----	----	----	----	----	----
175	----	----	----	2.01	----	----	----	3.50	----	----	----	----	----	----	----	----	----	----	----	----
180	0.90	----	2.54	2.55	3.09	----	----	3.72	----	----	----	----	----	----	----	----	----	----	----	----
185	----	----	----	1.19	----	----	----	3.49	----	----	----	----	----	----	----	----	----	----	----	----
195	0.50	----	1.14	1.92	1.93	----	----	2.90	----	----	----	----	----	----	----	----	----	----	----	----
215	----	----	----	0.74	----	----	----	1.90	----	----	----	----	----	----	----	----	----	----	----	----
225	----	----	----	0.72	----	----	----	1.76	----	----	----	----	----	----	----	----	----	----	----	----
250	----	----	----	0.32	----	----	----	1.14	----	----	----	----	----	----	----	----	----	----	----	----
275	----	----	----	0.19	----	----	----	0.63	----	----	----	----	----	----	----	----	----	----	----	----

(Continued)

Table 8 (Continued)

1000-ft Channel Stations	5	6	10	15	20	25	26	27	28	30	31	32	33	34	36	37	39	40	45	47
									Tidal Cycles after Release											
Test 5 (Continued)																				
Low-water Slack Concentration																				
165	----	----	----	0.60	----	----	----	1.63	----	----	----	----	----	----	----	----	----	----	----	----
180	1.83	----	2.66	2.53	3.09	----	----	2.93	----	----	----	----	----	----	----	----	----	----	----	----
190	----	----	----	3.46	----	----	----	3.95	----	----	----	----	----	----	----	----	----	----	----	----
195	1.71	----	2.19	3.19	3.54	----	----	3.79	----	----	----	----	----	----	----	----	----	----	----	----
200	----	----	----	3.46	----	----	----	4.47	----	----	----	----	----	----	----	----	----	----	----	----
205	----	----	----	4.06	----	----	----	4.57	----	----	----	----	----	----	----	----	----	----	----	----
210	1.38	----	2.28	3.[illegible]	3.60	----	----	3.96	----	----	----	----	----	----	----	----	----	----	----	----
215	----	----	----	3.18	----	----	----	4.07	----	----	----	----	----	----	----	----	----	----	----	----
220	----	----	----	3.05	----	----	----	3.94	----	----	----	----	----	----	----	----	----	----	----	----
225	1.24	----	2.28	2.87	3.66	----	----	3.79	----	----	----	----	----	----	----	----	----	----	----	----
230	0.20	----	0.75	0.80	1.79	----	----	2.27	----	----	----	----	----	----	----	----	----	----	----	----
275	----	----	----	0.76	----	----	----	1.64	----	----	----	----	----	----	----	----	----	----	----	----
Test 6																				
High-water Slack Concentration																				
125	----	----	----	0.20	----	----	----	----	0.21	----	----	----	----	----	----	----	----	----	----	----
135	----	----	----	0.48	----	----	----	----	0.72	----	----	----	----	----	----	----	----	----	----	----
140	0.71	----	0.89	0.74	1.10	----	----	----	0.67	----	----	----	----	----	----	----	----	----	----	----
145	----	----	----	0.94	----	----	----	----	1.02	----	----	----	----	----	----	----	----	----	----	----
150	----	----	----	1.04	----	----	----	----	1.38	----	----	----	----	----	----	----	----	----	----	----
155	0.58	----	1.15	1.19	1.35	----	----	----	1.51	----	----	----	----	----	----	----	----	----	----	----
160	----	----	----	1.51	----	----	----	----	1.61	----	----	----	----	----	----	----	----	----	----	----
165	----	----	----	1.46	----	----	----	----	1.84	----	----	----	----	----	----	----	----	----	----	----
170	0.72	----	1.10	1.60	1.35	----	----	----	2.04	----	----	----	----	----	----	----	----	----	----	----
180	0.66	----	1.00	1.37	1.51	----	----	----	1.71	----	----	----	----	----	----	----	----	----	----	----
185	----	----	----	1.43	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
190	0.43	----	0.87	----	1.27	----	----	----	1.15	----	----	----	----	----	----	----	----	----	----	----
200	----	----	----	----	----	----	----	----	1.07	----	----	----	----	----	----	----	----	----	----	----
210	0.21	----	0.40	----	0.69	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
225	----	----	----	0.48	----	----	----	----	0.74	----	----	----	----	----	----	----	----	----	----	----
250	----	----	----	0.26	----	----	----	----	0.64	----	----	----	----	----	----	----	----	----	----	----
Low-water Slack Concentration																				
155	0.28	----	0.18	----	0.07	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
170	0.69	----	0.25	0.16	0.21	----	----	----	0.49	----	----	----	----	----	----	----	----	----	----	----
175	----	----	----	0.44	----	----	----	----	2.35	----	----	----	----	----	----	----	----	----	----	----
180	0.35	----	0.44	0.61	0.72	----	----	----	0.69	----	----	----	----	----	----	----	----	----	----	----
185	----	----	----	0.92	----	----	----	----	0.94	----	----	----	----	----	----	----	----	----	----	----
190	0.67	----	1.19	1.04	1.19	----	----	----	2.29	----	----	----	----	----	----	----	----	----	----	----
195	----	----	----	1.09	----	----	----	----	1.53	----	----	----	----	----	----	----	----	----	----	----
200	0.99	----	1.00	1.40	1.63	----	----	----	1.75	----	----	----	----	----	----	----	----	----	----	----
205	----	----	----	1.66	----	----	----	----	2.01	----	----	----	----	----	----	----	----	----	----	----
210	----	----	----	1.61	----	----	----	----	2.05	----	----	----	----	----	----	----	----	----	----	----
215	----	----	----	1.48	----	----	----	----	1.65	----	----	----	----	----	----	----	----	----	----	----
220	----	----	----	1.25	----	----	----	----	2.34	----	----	----	----	----	----	----	----	----	----	----
225	0.89	----	1.19	1.81	1.61	----	----	----	1.46	----	----	----	----	----	----	----	----	----	----	----
250	----	----	----	0.72	----	----	----	----	0.64	----	----	----	----	----	----	----	----	----	----	----
275	----	----	----	0.30	----	----	----	----	0.76	----	----	----	----	----	----	----	----	----	----	----
Test 7																				
High-water Slack Concentration																				
125	0.07	----	0.07	0.12	0.19	----	0.14	----	----	----	----	----	----	----	----	----	----	----	----	----
140	0.44	----	0.76	0.70	1.69	----	0.70	----	----	----	----	----	----	----	----	----	----	----	----	----
155	0.34	----	0.74	1.03	0.85	----	1.11	----	----	----	----	----	----	----	----	----	----	----	----	----
165	0.32	----	0.91	1.07	0.97	----	1.21	----	----	----	----	----	----	----	----	----	----	----	----	----
175	0.31	----	0.81	1.03	1.00	----	1.30	----	----	----	----	----	----	----	----	----	----	----	----	----
185	0.17	----	0.76	0.86	1.07	----	1.21	----	----	----	----	----	----	----	----	----	----	----	----	----
200	0.07	----	0.23	0.59	0.60	----	0.76	----	----	----	----	----	----	----	----	----	----	----	----	----
225	0.04	----	0.12	0.25	0.39	----	0.57	----	----	----	----	----	----	----	----	----	----	----	----	----
250	0.01	----	0.05	0.16	0.23	----	0.39	----	----	----	----	----	----	----	----	----	----	----	----	----
Low-water Slack Concentration																				
170	0.07	----	0.06	0.18	0.15	----	0.14	----	----	----	----	----	----	----	----	----	----	----	----	----
185	0.43	----	0.96	0.98	1.10	----	0.52	----	----	----	----	----	----	----	----	----	----	----	----	----
195	0.44	----	0.81	1.00	0.78	----	1.06	----	----	----	----	----	----	----	----	----	----	----	----	----
205	0.44	----	1.56	1.72	1.13	----	1.32	----	----	----	----	----	----	----	----	----	----	----	----	----
210	0.36	----	1.54	1.17	1.19	----	1.32	----	----	----	----	----	----	----	----	----	----	----	----	----
215	0.31	----	0.80	1.16	1.13	----	1.35	----	----	----	----	----	----	----	----	----	----	----	----	----
225	0.33	----	0.54	1.06	1.12	----	1.25	----	----	----	----	----	----	----	----	----	----	----	----	----
250	0.07	----	0.17	0.38	0.57	----	0.80	----	----	----	----	----	----	----	----	----	----	----	----	----
275	0.12	----	0.09	0.21	0.44	----	0.60	----	----	----	----	----	----	----	----	----	----	----	----	----

(Continued)

Table 2 (Continued)

1000-ft Channel Stations	Tidal Cycles after Release																			
	5	6	10	15	20	25	26	27	28	30	31	32	33	35	36	37	39	40	[illegible]	[illegible]
Test 8																				
High-water Slack Concentration																				
125	0.04	----	0.12	0.13	0.14	----	----	0.08	----	----	----	----	----	----	----	----	----	----	----	----
140	0.25	----	0.53	0.54	0.66	----	----	0.53	----	----	----	----	----	----	----	----	----	----	----	----
155	0.28	----	0.81	0.83	0.84	----	----	0.87	----	----	----	----	----	----	----	----	----	----	----	----
165	0.30	----	0.81	0.93	1.03	----	----	0.97	----	----	----	----	----	----	----	----	----	----	----	----
175	0.31	----	0.70	0.64	1.03	----	----	1.01	----	----	----	----	----	----	----	----	----	----	----	----
185	0.23	----	0.61	0.74	1.04	----	----	1.07	----	----	----	----	----	----	----	----	----	----	----	----
200	0.11	----	0.25	0.52	0.58	----	----	0.70	----	----	----	----	----	----	----	----	----	----	----	----
225	0.05	----	0.12	0.29	0.41	----	----	0.61	----	----	----	----	----	----	----	----	----	----	----	----
250	0.03	----	0.08	0.18	0.23	----	----	0.31	----	----	----	----	----	----	----	----	----	----	----	----
Low-water Slack Concentration																				
170	0.07	----	0.12	0.16	0.11	----	----	0.16	----	----	----	----	----	----	----	----	----	----	----	----
185	0.25	----	0.56	0.62	0.63	----	----	0.49	----	----	----	----	----	----	----	----	----	----	----	----
195	0.39	----	0.76	0.86	0.96	----	----	0.75	----	----	----	----	----	----	----	----	----	----	----	----
205	0.52	----	1.10	1.15	1.24	----	----	1.10	----	----	----	----	----	----	----	----	----	----	----	----
210	0.44	----	0.97	0.99	1.14	----	----	1.06	----	----	----	----	----	----	----	----	----	----	----	----
215	0.50	----	0.94	1.02	1.13	----	----	1.23	----	----	----	----	----	----	----	----	----	----	----	----
225	0.42	----	0.87	0.96	1.14	----	----	1.06	----	----	----	----	----	----	----	----	----	----	----	----
250	0.11	----	0.22	0.44	0.63	----	----	0.69	----	----	----	----	----	----	----	----	----	----	----	----
275	0.03	----	0.16	0.30	0.45	----	----	0.55	----	----	----	----	----	----	----	----	----	----	----	----
Test 9																				
High-water Slack Concentration																				
120	0.08	----	0.17	0.17	0.04	----	----	0.17	----	----	----	----	----	----	----	----	----	----	----	----
140	0.21	----	0.51	0.34	0.46	----	----	0.72	----	----	----	----	----	----	----	----	----	----	----	----
150	0.29	----	0.55	0.55	0.80	----	----	1.18	----	----	----	----	----	----	----	----	----	----	----	----
160	0.63	----	0.72	0.59	1.01	----	----	1.35	----	----	----	----	----	----	----	----	----	----	----	----
170	0.25	----	0.42	0.67	0.76	----	----	1.18	----	----	----	----	----	----	----	----	----	----	----	----
180	0.25	----	0.46	0.63	0.76	----	----	0.88	----	----	----	----	----	----	----	----	----	----	----	----
190	0.25	----	0.29	0.46	0.63	----	----	0.88	----	----	----	----	----	----	----	----	----	----	----	----
205	0.29	----	0.21	0.38	0.38	----	----	0.51	----	----	----	----	----	----	----	----	----	----	----	----
250	0.29	----	0.13	0.25	0.38	----	----	0.38	----	----	----	----	----	----	----	----	----	----	----	----
Low-water Slack Concentration																				
170	0.08	----	0.13	0.13	0.17	----	----	0.25	----	----	----	----	----	----	----	----	----	----	----	----
180	0.17	----	0.17	0.34	0.29	----	----	0.55	----	----	----	----	----	----	----	----	----	----	----	----
190	0.51	----	0.59	0.76	1.09	----	----	1.73	----	----	----	----	----	----	----	----	----	----	----	----
200	0.51	----	0.93	0.88	1.98	----	----	2.02	----	----	----	----	----	----	----	----	----	----	----	----
210	0.80	----	0.59	1.05	1.05	----	----	1.94	----	----	----	----	----	----	----	----	----	----	----	----
215	0.25	----	0.46	1.05	0.97	----	----	1.35	----	----	----	----	----	----	----	----	----	----	----	----
225	0.29	----	0.38	0.55	0.67	----	----	1.05	----	----	----	----	----	----	----	----	----	----	----	----
250	0.25	----	0.34	0.35	0.84	----	----	0.72	----	----	----	----	----	----	----	----	----	----	----	----
275	0.13	----	0.17	0.23	0.35	----	----	0.45	----	----	----	----	----	----	----	----	----	----	----	----
Test 10																				
High-water Slack Concentration																				
125	0.12	----	0.16	[illegible]	0.16	0.22	----	----	----	----	----	----	0.27	----	----	----	----	----	----	----
140	0.42	----	0.66	[illegible]	0.81	0.82	----	----	----	----	----	----	0.81	----	----	----	----	----	----	----
150	0.69	----	1.21	1.41	1.28	1.34	----	----	----	----	----	----	1.34	----	----	----	----	----	----	----
160	0.65	----	1.10	1.43	1.55	1.58	----	----	----	----	----	----	1.41	----	----	----	----	----	----	----
170	0.54	----	1.12	1.22	1.50	1.50	----	----	----	----	----	----	1.49	----	----	----	----	----	----	----
180	0.45	----	0.79	1.21	1.30	1.47	----	----	----	----	----	----	1.44	----	----	----	----	----	----	----
190	0.21	----	0.52	0.85	0.92	1.10	----	----	----	----	----	----	1.08	----	----	----	----	----	----	----
205	0.10	----	0.37	0.51	0.70	0.85	----	----	----	----	----	----	0.93	----	----	----	----	----	----	----
250	0.05	----	0.08	0.23	0.28	0.47	----	----	----	----	----	----	0.37	----	----	----	----	----	----	----
Low-water Slack Concentration																				
170	0.08	----	0.14	0.13	0.18	0.19	----	----	----	----	----	----	0.21	----	----	----	----	----	----	----
180	0.33	----	0.47	0.76	0.62	0.60	----	----	----	----	----	----	0.72	----	----	----	----	----	----	----
190	1.21	----	1.45	1.30	1.23	1.41	----	----	----	----	----	----	1.65	----	----	----	----	----	----	----
200	1.27	----	1.72	1.93	2.08	1.76	----	----	----	----	----	----	1.94	----	----	----	----	----	----	----
210	0.60	----	1.67	1.68	0.85	1.30	----	----	----	----	----	----	1.79	----	----	----	----	----	----	----
215	0.56	----	1.22	1.45	1.61	1.69	----	----	----	----	----	----	1.67	----	----	----	----	----	----	----
225	0.42	----	0.98	1.24	1.40	1.47	----	----	----	----	----	----	1.39	----	----	----	----	----	----	----
250	0.11	----	0.37	0.63	0.77	0.91	----	----	----	----	----	----	[illegible]	----	----	----	----	----	----	----
275	0.02	----	0.17	0.36	0.48	0.66	----	----	----	----	----	----	0.72	----	----	----	----	----	----	----
Test 11																				
High-water Slack Concentration																				
125	0.19	----	0.13	0.19	0.11	0.19	----	----	----	----	0.25	----	----	----	0.18	----	----	----	----	----
140	0.30	----	0.54	0.68	0.69	0.82	----	----	----	----	0.95	----	----	----	0.94	----	----	----	----	----
150	0.59	----	0.97	1.13	1.29	1.39	----	----	----	----	[illegible]	----	----	----	[illegible]	----	----	----	----	----
160	0.61	----	[illegible]	[illegible]	1.49	1.52	----	----	----	----	1.54	----	----	----	1.61	----	----	----	----	----
170	0.45	----	0.95	1.22	1.40	1.58	----	----	----	----	1.78	----	----	----	1.69	----	----	----	----	----
180	0.39	----	0.99	1.13	1.35	1.43	----	----	----	----	1.53	----	----	----	1.65	----	----	----	----	----
190	0.20	----	0.53	0.70	0.97	1.15	----	----	----	----	1.28	----	----	----	1.35	----	----	----	----	----
205	0.10	----	0.34	0.53	0.70	0.69	----	----	----	----	1.10	----	----	----	1.18	----	----	----	----	----
250	0.09	----	0.13	0.23	0.36	0.46	----	----	----	----	0.61	----	----	----	0.71	----	----	----	----	----

(Continued)

Table 2 (Continued)

1000-ft Channel Stations	5	6	10	15	20	25	26	27	28	30	31	32	33	35	36	37	39	40	45	47
Test 11 (Continued)																				
Low-water Slack Concentration																				
170	0.09	----	0.09	0.15	0.14	0.18	----	----	----	----	0.20	----	----	----	0.35	----	----	----	----	----
180	0.39	----	0.46	0.51	0.40	0.69	----	----	----	----	0.73	----	----	----	0.56	----	----	----	----	----
190	1.17	----	1.13	1.38	1.23	1.45	----	----	----	----	1.40	----	----	----	1.67	----	----	----	----	----
200	1.13	----	1.49	1.66	1.66	1.98	----	----	----	----	1.56	----	----	----	2.02	----	----	----	----	----
205	1.12	----	1.62	1.93	2.13	2.09	----	----	----	----	2.21	----	----	----	2.26	----	----	----	----	----
215	0.59	----	1.23	1.43	1.71	1.73	----	----	----	----	1.04	----	----	----	2.04	----	----	----	----	----
225	0.44	----	0.93	1.23	1.45	1.55	----	----	----	----	1.69	----	----	----	1.78	----	----	----	----	----
250	0.14	----	0.35	0.58	0.80	0.97	----	----	----	----	1.12	----	----	----	1.81	----	----	----	----	----
275	0.06	----	0.23	0.44	0.56	0.68	----	----	----	----	0.90	----	----	----	1.04	----	----	----	----	----
Test 12																				
High-water Slack Concentration																				
125	0.03	----	0.11	0.11	0.09	0.20	----	----	----	----	0.11	----	----	----	0.09	----	----	----	----	----
140	0.21	----	0.47	0.39	0.45	0.54	----	----	----	----	0.57	----	----	----	0.45	----	----	----	----	----
155	0.43	----	0.68	0.72	0.74	0.78	----	----	----	----	1.09	----	----	----	0.72	----	----	----	----	----
165	0.43	----	0.71	0.78	0.85	0.89	----	----	----	----	1.06	----	----	----	0.81	----	----	----	----	----
175	0.34	----	0.63	0.83	0.83	0.88	----	----	----	----	1.06	----	----	----	0.95	----	----	----	----	----
185	0.44	----	0.65	0.77	0.83	0.94	----	----	----	----	0.95	----	----	----	0.72	----	----	----	----	----
200	0.08	----	0.35	0.47	0.51	0.68	----	----	----	----	0.68	----	----	----	0.68	----	----	----	----	----
225	0.04	----	0.15	0.27	0.36	0.41	----	----	----	----	0.53	----	----	----	0.47	----	----	----	----	----
250	0.03	----	0.11	0.23	0.29	0.33	----	----	----	----	0.36	----	----	----	0.35	----	----	----	----	----
Low-water Slack Concentration																				
170	0.03	----	0.08	0.08	0.09	0.11	----	----	----	----	0.11	----	----	----	0.12	----	----	----	----	----
185	0.34	----	0.41	0.41	0.44	0.54	----	----	----	----	0.48	----	----	----	0.56	----	----	----	----	----
195	0.40	----	0.57	0.62	0.63	0.69	----	----	----	----	0.57	----	----	----	0.65	----	----	----	----	----
205	0.62	----	0.78	0.95	0.95	1.07	----	----	----	----	1.09	----	----	----	1.01	----	----	----	----	----
210	0.56	----	0.83	0.91	0.89	0.98	----	----	----	----	1.00	----	----	----	0.98	----	----	----	----	----
215	0.65	----	0.78	0.91	0.91	0.91	----	----	----	----	1.01	----	----	----	1.03	----	----	----	----	----
225	0.44	----	0.78	0.94	0.95	0.97	----	----	----	----	1.01	----	----	----	1.10	----	----	----	----	----
250	0.12	----	0.35	0.48	0.54	0.56	----	----	----	----	0.66	----	----	----	0.60	----	----	----	----	----
275	0.04	----	0.14	0.32	0.41	0.47	----	----	----	----	0.50	----	----	----	0.47	----	----	----	----	----
Test 13																				
High-water Slack Concentration																				
125	----	0.17	0.15	0.14	0.47	0.31	----	----	----	----	----	0.20	----	----	----	0.21	----	----	----	----
140	----	0.62	0.69	0.67	1.61	1.31	----	----	----	----	----	1.05	----	----	----	0.68	----	----	----	----
155	----	0.78	1.03	1.15	1.38	2.90	----	----	----	----	----	1.59	----	----	----	1.17	----	----	----	----
165	----	0.65	1.04	1.20	1.41	2.17	----	----	----	----	----	1.90	----	----	----	1.25	----	----	----	----
175	----	0.74	1.07	1.25	1.47	2.07	----	----	----	----	----	1.85	----	----	----	1.47	----	----	----	----
185	----	0.69	0.80	1.21	1.42	2.10	----	----	----	----	----	1.81	----	----	----	1.41	----	----	----	----
200	----	0.26	0.47	0.67	0.85	1.05	----	----	----	----	----	1.46	----	----	----	1.31	----	----	----	----
225	----	0.10	0.25	0.37	0.53	0.69	----	----	----	----	----	1.90	----	----	----	1.04	----	----	----	----
250	----	0.06	0.16	0.27	0.41	0.52	----	----	----	----	----	0.77	----	----	----	0.82	----	----	----	----
Low-water Slack Concentration																				
170	----	0.09	0.10	0.16	0.17	0.32	----	----	----	----	----	0.23	----	----	----	0.15	----	----	----	----
185	----	0.68	0.59	0.72	1.00	1.38	----	----	----	----	----	0.93	----	----	----	0.65	----	----	----	----
195	----	0.80	0.83	1.00	1.30	1.77	----	----	----	----	----	1.41	----	----	----	0.91	----	----	----	----
205	----	1.10	1.30	1.51	1.79	2.78	----	----	----	----	----	1.95	----	----	----	1.38	----	----	----	----
210	----	0.95	1.21	1.43	1.61	2.31	----	----	----	----	----	1.95	----	----	----	1.43	----	----	----	----
215	----	0.86	1.20	1.35	1.54	2.37	----	----	----	----	----	2.03	----	----	----	1.51	----	----	----	----
225	----	0.78	1.15	1.31	1.51	2.27	----	----	----	----	----	2.01	----	----	----	1.51	----	----	----	----
250	----	0.22	0.41	0.69	0.85	1.07	----	----	----	----	----	----	----	----	----	1.27	----	----	----	----
275	----	0.11	0.26	0.43	0.59	0.77	----	----	----	----	----	1.05	----	----	----	1.09	----	----	----	----
Test 14																				
High-water Slack Concentration																				
125	0.14	----	0.40	0.44	0.40	0.38	----	----	----	----	0.58	----	----	----	----	----	0.36	----	----	0.74
145	1.05	----	2.36	[illegible]	1.59	2.16	----	----	----	----	2.05	----	----	----	----	----	2.62	----	----	2.52
160	1.29	----	2.54	[illegible]	2.62	2.82	----	----	----	----	2.78	----	----	----	----	----	3.20	----	----	3.42
170	1.19	----	2.30	[illegible]	2.36	2.86	----	----	----	----	3.04	----	----	----	----	----	3.15	----	----	3.50
180	1.01	----	2.09	2.68	2.64	2.42	----	----	----	----	----	----	----	----	----	----	3.00	----	----	3.38
190	0.68	----	1.23	2.01	2.26	[illegible]	----	----	----	----	2.56	----	----	----	----	----	2.60	----	----	2.96
200	0.38	----	1.19	1.51	1.83	1.53	----	----	----	----	2.28	----	----	----	----	----	2.35	----	----	2.70
225	0.10	----	0.40	0.91	1.17	1.43	----	----	----	----	1.69	----	----	----	----	----	2.07	----	----	[illegible]
250	0.18	----	0.22	0.70	0.87	1.07	----	----	----	----	1.49	----	----	----	----	----	1.57	----	----	1.75
Low-water Slack Concentration																				
170	0.12	----	0.32	0.22	0.28	0.34	----	----	----	----	0.30	----	----	----	----	----	0.76	----	----	0.48
185	1.23	----	2.24	1.81	1.55	1.69	----	----	----	----	2.30	----	----	----	----	----	2.30	----	----	[illegible]
195	1.33	----	2.64	2.36	2.11	[illegible]	----	----	----	----	2.03	----	----	----	----	----	2.74	----	----	[illegible]
205	1.87	----	3.46	3.62	3.30	3.87	----	----	----	----	3.62	----	----	----	----	----	4.39	----	----	[illegible]
210	1.67	----	2.64	3.15	3.28	3.46	----	----	----	----	3.74	----	----	----	----	----	[illegible]	----	----	3.69
215	1.39	----	2.62	3.02	3.12	3.32	----	----	----	----	3.54	----	----	----	----	----	[illegible]	----	----	3.87
225	1.07	----	2.38	2.92	3.00	3.06	----	----	----	----	3.28	----	----	----	----	----	3.30	----	----	3.80
250	0.30	----	0.81	1.45	1.93	1.95	----	----	----	----	2.14	----	----	----	----	----	2.36	----	----	2.58
275	0.18	----	0.46	0.87	1.35	1.57	----	----	----	----	1.67	----	----	----	----	----	1.97	----	----	2.30

(Continued)

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Table 2 (Continued)

1000-ft Channel Stations	Tidal Cycles after Release																			
	5	6	10	15	20	25	26	27	29	30	31	32	33	35	36	37	39	40	45	47
Test 15																				
High-water Slack Concentration																				
125	0.02	----	0.06	0.06	0.14	0.07	----	----	----	----	0.10	----	----	----	0.02	----	----	----	----	----
145	0.40	----	0.65	0.71	0.67	0.60	----	----	----	----	0.79	----	----	----	0.60	----	----	----	----	----
160	0.96	----	1.24	1.13	1.02	1.65	----	----	----	----	1.04	----	----	----	1.19	----	----	----	----	----
170	0.67	----	1.63	1.77	1.32	1.26	----	----	----	----	1.65	----	----	----	1.24	----	----	----	----	----
180	1.11	----	1.84	1.93	1.73	1.64	----	----	----	----	1.72	----	----	----	1.69	----	----	----	----	----
190	0.63	----	1.45	1.77	1.80	1.62	----	----	----	----	1.64	----	----	----	1.63	----	----	----	----	----
200	0.32	----	1.14	1.46	1.62	1.52	----	----	----	----	1.48	----	----	----	1.56	----	----	----	----	----
225	0.13	----	0.63	1.14	1.31	1.40	----	----	----	----	1.35	----	----	----	1.35	----	----	----	----	----
250	0.08	----	0.46	0.78	1.09	1.19	----	----	----	----	1.30	----	----	----	1.23	----	----	----	----	----
Low-water Slack Concentration																				
170	0.00	----	0.03	0.06	0.03	0.03	----	----	----	----	0.06	----	----	----	0.05	----	----	----	----	----
185	0.59	----	1.03	1.03	0.68	0.17	----	----	----	----	0.60	----	----	----	0.92	----	----	----	----	----
195	0.68	----	0.91	0.94	0.62	0.69	----	----	----	----	0.76	----	----	----	0.83	----	----	----	----	----
205	2.07	----	2.45	2.28	1.93	2.05	----	----	----	----	2.19	----	----	----	1.85	----	----	----	----	----
210	1.61	----	2.76	2.26	1.70	1.72	----	----	----	----	1.93	----	----	----	1.61	----	----	----	----	----
215	1.47	----	2.28	2.23	1.86	1.89	----	----	----	----	2.17	----	----	----	1.94	----	----	----	----	----
225	1.24	----	2.22	2.20	1.86	1.78	----	----	----	----	1.94	----	----	----	1.92	----	----	----	----	----
250	0.37	----	1.11	1.56	1.61	1.56	----	----	----	----	1.45	----	----	----	1.60	----	----	----	----	----
275	0.16	----	0.70	1.22	1.44	1.46	----	----	----	----	1.45	----	----	----	1.41	----	----	----	----	----
Test 16																				
High-water Slack Concentration																				
75	----	----	----	----	----	0.13	----	----	----	----	----	----	0.38	----	----	----	----	----	----	----
100	----	----	----	----	----	0.69	----	----	----	----	----	----	0.72	----	----	----	----	----	----	----
105	----	----	0.30	0.59	0.55	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
125	0.52	----	0.89	1.29	1.23	1.54	----	----	----	----	----	----	1.89	----	----	----	----	----	----	----
140	----	----	1.69	1.98	2.16	2.40	----	----	----	----	----	----	2.73	----	----	----	----	----	----	----
145	1.19	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
160	0.87	----	1.43	1.78	2.04	2.17	----	----	----	----	----	----	2.54	----	----	----	----	----	----	----
170	0.73	----	1.19	1.57	1.69	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
180	0.79	----	1.04	1.48	1.66	1.82	----	----	----	----	----	----	2.21	----	----	----	----	----	----	----
190	0.41	----	0.75	1.23	1.10	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
200	0.23	----	0.44	0.70	0.91	1.07	----	----	----	----	----	----	1.20	----	----	----	----	----	----	----
225	0.08	----	0.23	0.40	0.53	0.72	----	----	----	----	----	----	1.23	----	----	----	----	----	----	----
250	0.08	----	0.12	0.25	0.47	0.58	----	----	----	----	----	----	0.84	----	----	----	----	----	----	----
Low-water Slack Concentration																				
120	----	----	----	----	----	0.17	----	----	----	----	----	----	0.24	----	----	----	----	----	----	----
140	----	----	----	----	----	0.42	----	----	----	----	----	----	0.64	----	----	----	----	----	----	----
160	----	----	----	----	----	1.07	----	----	----	----	----	----	1.31	----	----	----	----	----	----	----
170	0.46	----	1.01	1.23	1.40	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
180	----	----	----	----	----	2.08	----	----	----	----	----	----	2.53	----	----	----	----	----	----	----
185	1.65	----	1.83	1.86	2.40	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
190	----	----	----	----	----	2.62	----	----	----	----	----	----	3.01	----	----	----	----	----	----	----
195	1.43	----	1.61	1.87	2.23	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
200	1.65	----	1.93	2.20	2.38	2.50	----	----	----	----	----	----	2.99	----	----	----	----	----	----	----
205	1.53	----	1.91	2.26	2.16	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
215	1.03	----	1.43	1.77	1.97	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
225	0.73	----	1.13	1.74	1.87	1.97	----	----	----	----	----	----	2.33	----	----	----	----	----	----	----
250	0.29	----	0.47	0.68	0.92	1.04	----	----	----	----	----	----	1.41	----	----	----	----	----	----	----
275	0.10	----	0.27	0.46	0.59	0.74	----	----	----	----	----	----	0.98	----	----	----	----	----	----	----
Test 17																				
High-water Slack Concentration																				
125	0.10	----	0.13	0.30	0.33	0.38	----	----	----	----	----	0.55	----	----	----	----	----	----	----	----
145	0.61	----	0.79	1.41	1.54	1.77	----	----	----	----	----	1.73	----	----	----	----	----	----	----	----
160	0.63	----	0.99	1.68	2.04	2.19	----	----	----	----	----	2.34	----	----	----	----	----	----	----	----
170	0.59	----	0.98	1.62	1.99	2.19	----	----	----	----	----	2.64	----	----	----	----	----	----	----	----
180	0.56	----	0.90	1.32	1.90	2.13	----	----	----	----	----	2.35	----	----	----	----	----	----	----	----
190	0.28	----	0.73	1.00	1.42	1.68	----	----	----	----	----	1.80	----	----	----	----	----	----	----	----
200	0.15	----	0.43	0.71	1.14	1.25	----	----	----	----	----	1.66	----	----	----	----	----	----	----	----
225	0.10	----	0.22	0.44	0.68	1.00	----	----	----	----	----	1.24	----	----	----	----	----	----	----	----
250	0.07	----	0.14	0.33	0.49	0.66	----	----	----	----	----	0.99	----	----	----	----	----	----	----	----
Low-water Slack Concentration																				
170	0.05	----	0.10	0.28	0.33	0.50	----	----	----	----	----	0.37	----	----	----	----	----	----	----	----
185	0.62	----	0.70	1.45	1.81	2.05	----	----	----	----	----	1.47	----	----	----	----	----	----	----	----
195	0.58	----	0.85	1.46	2.02	2.18	----	----	----	----	----	1.91	----	----	----	----	----	----	----	----
205	0.94	----	0.99	1.53	2.64	2.92	----	----	----	----	----	2.77	----	----	----	----	----	----	----	----
210	0.83	----	1.12	2.21	2.50	2.71	----	----	----	----	----	2.80	----	----	----	----	----	----	----	----
215	0.66	----	1.22	1.93	2.31	[illegible]	----	----	----	----	----	2.67	----	----	----	----	----	----	----	----
225	0.75	----	1.05	1.61	2.34	[illegible]	----	----	----	----	----	2.48	----	----	----	----	----	----	----	----
250	0.21	----	0.42	0.74	0.98	[illegible]	----	----	----	----	----	1.62	----	----	----	----	----	----	----	----
275	0.13	----	0.31	0.44	0.73	0.94	----	----	----	----	----	1.34	----	----	----	----	----	----	----	----

(Continued)

Table 2 (Continued)

1000-ft Channel Stations	Tidal Cycles after Release																			
	5	6	10	15	20	25	26	27	28	30	31	32	33	35	36	37	39	40	45	47
										Test 18										
										High-water Slack Concentration										
120	0.22	----	0.14	0.18	0.15	0.15	----	----	----	----	----	0.21	----	----	----	0.30	----	----	----	----
140	0.51	----	0.92	1.04	1.36	1.25	----	----	----	----	----	1.41	----	----	----	1.43	----	----	----	----
160	1.19	----	2.15	2.51	2.67	2.80	----	----	----	----	----	2.85	----	----	----	3.11	----	----	----	----
170	1.14	----	2.19	2.47	2.66	2.98	----	----	----	----	----	2.78	----	----	----	3.23	----	----	----	----
180	1.00	----	1.93	2.51	2.75	3.08	----	----	----	----	----	2.94	----	----	----	3.31	----	----	----	----
190	0.60	----	1.29	1.73	2.16	2.53	----	----	----	----	----	2.60	----	----	----	2.92	----	----	----	----
200	0.32	----	0.92	1.46	1.85	2.19	----	----	----	----	----	2.11	----	----	----	2.56	----	----	----	----
225	0.10	----	0.46	0.92	1.21	1.67	----	----	----	----	----	1.94	----	----	----	2.23	----	----	----	----
250	0.08	----	0.30	0.65	0.94	1.28	----	----	----	----	----	1.57	----	----	----	1.88	----	----	----	----
										Low-water Slack Concentration										
170	0.11	----	0.14	0.21	0.20	0.17	----	----	----	----	----	0.28	----	----	----	0.37	----	----	----	----
185	1.33	----	1.57	1.37	1.58	1.73	----	----	----	----	----	1.48	----	----	----	1.54	----	----	----	----
195	1.07	----	1.59	1.87	2.02	2.18	----	----	----	----	----	2.16	----	----	----	1.98	----	----	----	----
205	2.12	----	3.11	3.54	3.70	3.34	----	----	----	----	----	4.11	----	----	----	4.09	----	----	----	----
210	1.64	----	2.74	3.31	3.50	3.62	----	----	----	----	----	3.48	----	----	----	4.40	----	----	----	----
215	1.37	----	2.46	3.01	3.29	3.59	----	----	----	----	----	3.51	----	----	----	3.29	----	----	----	----
225	1.08	----	2.15	2.67	3.01	3.29	----	----	----	----	----	3.28	----	----	----	3.29	----	----	----	----
250	0.32	----	0.96	1.55	1.85	2.06	----	----	----	----	----	2.34	----	----	----	2.52	----	----	----	----
275	0.18	----	0.59	0.97	1.33	1.78	----	----	----	----	----	1.98	----	----	----	4.09	----	----	----	----

Table 3

du Pont Effluent Dispersion Tests

Local Concentrations in ppm

Sampling Stations	Time in Hours																								
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
Test 3, Samples Taken during Cycles 42-44																									
N	1.57	---	---	---	---	---	---	2.90	---	---	---	---	---	7.02	---	---	---	---	---	2.00	---	---	---	---	---
EE	---	---	---	---	---	---	2.97	---	---	---	---	---	7.29	---	---	---	---	---	3.50	---	---	---	---	---	1.78
M	1.34	---	---	---	---	4.46	---	---	---	---	---	8.23	---	---	---	---	---	4.07	---	---	---	---	---	---	---
Y	---	---	2.06	---	---	---	---	---	---	---	---	---	---	---	---	1.20	---	---	---	2.30	---	---	---	2.02	---
B	2.30	---	---	---	---	---	---	---	---	---	---	---	---	---	1.82	---	---	---	3.78	---	4.57	---	---	---	---
J	---	---	2.59	---	2.26	---	---	---	---	---	---	---	---	---	---	---	---	---	1.97	---	---	---	1.37	---	---
R (top)*	---	---	---	---	---	---	---	---	---	---	1.38	---	---	---	1.08	---	0.73	---	---	---	1.82	---	---	---	---
R (bottom)	---	---	---	---	---	---	---	---	---	---	1.86	---	---	---	1.92	---	7.18	---	---	---	2.28	---	---	---	---
FN (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.84	---	---	---	1.14	---	1.82	---	1.92	---	---
FN (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.10	---	---	---	4.51	---	2.00	---	1.89	---	---
Test 4, Samples Taken during Cycles 22-26																									
N	1.72	---	---	---	---	---	---	4.78	---	---	---	---	---	2.71	---	---	---	---	---	1.56	---	---	---	---	---
M	---	---	---	---	---	---	25.4	---	---	---	---	---	11.87	---	---	---	---	---	2.47	---	---	---	---	---	1.87
L	---	---	---	2.70	---	---	---	9.48	---	---	---	29.5	---	---	---	21.4	---	---	---	7.75	---	---	---	2.52	---
K	---	---	2.14	---	---	---	33.8	---	---	---	8.95	---	---	---	8.00	---	---	---	3.82	---	---	---	2.03	---	---
R	---	---	4.21	---	11.88	35.4	15.5	---	---	---	30.5	---	---	---	25.0	---	---	---	4.91	---	---	---	2.02	---	---
A	---	---	9.55	---	---	---	69.0	---	---	---	43.0	---	---	---	70.1	---	---	---	49.1	---	---	---	7.87	---	---
B	---	---	138	---	---	---	4.82	---	---	---	134	---	---	---	400	---	---	---	268	---	---	---	35.2	---	---
C	---	---	---	5.42	---	---	---	5.55	---	---	---	6.00	---	---	---	9.58	---	---	---	8.68	---	---	---	8.09	---
D	---	---	2.17	---	---	---	---	---	3.54	---	---	---	---	---	---	0.33	---	---	---	8.50	---	---	---	5.78	---
LL	1.80	---	---	---	---	---	2.76	---	---	---	---	---	0.95	---	---	---	0.60	---	---	---	1.84	---	---	---	---
[illegible]	---	---	2.12	---	---	---	1.45	---	---	---	1.25	---	---	---	---	---	0.33	---	---	---	2.38	---	1.67	---	2.06
[illegible]	2.13	---	1.94	---	---	---	---	---	---	---	---	---	---	---	---	---	0.97	---	1.84	---	---	---	2.70	---	2.38
E- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4.38	---	3.73	---	2.30	---	2.24	---	---
E- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3.48	---	3.87	---	2.45	---	2.03	---	---
FF- (top)	---	---	2.24	---	---	---	---	---	---	---	---	---	---	---	0.44	---	0.42	---	0.81	---	1.39	---	---	---	2.02
FF- (bottom)	---	---	1.65	---	---	---	---	---	---	---	---	---	---	---	0.62	---	2.14	---	2.24	---	1.59	---	---	---	1.69
Test 5, Samples Taken during Cycles 22-24																									
P	3.69	---	---	---	---	---	---	6.96	---	---	---	---	---	10.55	---	---	---	---	---	4.54	---	---	---	---	---
N	3.90	---	---	---	---	---	---	7.84	---	---	---	---	---	8.19	---	---	---	---	---	4.88	---	---	---	---	---
M	---	---	---	---	---	---	10.00	---	---	---	---	---	6.77	---	---	---	---	---	5.95	---	---	---	---	---	3.95
L	---	---	5.03	---	---	---	---	101	---	---	---	356	---	---	---	68.6	---	---	---	3.78	---	---	---	---	---
K	---	---	4.98	---	---	---	[illegible]	---	---	---	42.3	---	---	---	37.8	---	---	---	8.23	---	---	---	5.68	---	---
C	---	---	---	---	21.3	---	[illegible]	---	82.6	---	---	---	40.3	---	---	---	---	---	11.19	---	--	---	---	---	4.53
A	---	---	853	---	---	---	79.5	---	---	---	33.4	---	---	---	14.08	---	---	---	34.6	---	---	---	6.10	---	---
B	43.5	---	---	---	---	572	---	---	---	74.3	---	---	---	510	---	---	---	219	---	---	---	50.0	---	---	---
D	---	---	5.48	---	---	---	---	---	5.64	---	---	---	---	---	---	3.62	---	---	---	11.00	---	---	---	---	7.53
LL	---	---	---	---	---	---	4.70	---	---	---	---	---	---	---	---	---	---	---	---	---	4.54	---	---	---	---
[illegible]	---	---	4.56	---	---	---	---	---	---	---	3.46	---	---	---	---	---	1.99	---	---	---	4.79	---	---	---	4.35
[illegible]	4.60	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.86	---	---	4.73	---	---	4.54	---	---
R- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.71	---	3.27	---	4.22	---	4.20	---	---	---	---
R- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	15.4	---	6.37	---	5.64	---	4.66	---	---	---	---

(Continued)

Note: Times are expressed in hours after moon's transit of the 75th meridian.
* Samples taken at middepth unless otherwise noted.

Table 3 (Continued)

Sampling Stations	Time in Hours 0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
Test 6, Samples Taken during Cycles 23-25																									
P	2.02	---	---	---	---	---	---	---	5.27	---	---	---	---	5.70	---	---	---	---	---	1.55	---	---	---	---	---
E	1.29	---	---	---	---	---	---	---	4.46	---	---	---	---	6.12	---	---	---	---	---	1.61	---	---	---	---	---
T	---	---	---	---	---	---	---	11.13	---	---	---	---	12.02	---	---	---	4.26	---	1.99	---	---	---	---	---	1.78
M	---	---	---	---	---	---	---	9.94	---	---	---	---	6.63	---	---	---	3.62	---	1.40	---	---	---	---	---	2.06
L	---	---	2.01	---	---	---	2.24	---	---	---	---	---	---	---	---	6.30	---	---	---	---	4.49	---	---	---	---
K	---	---	2.42	---	---	---	1.99	---	---	---	---	1.88	---	---	---	1.93	---	---	---	---	2.04	---	---	---	---
E	---	---	---	---	2.34	---	---	---	---	---	1.73	---	---	---	1.17	---	---	---	1.68	---	---	---	2.17	---	---
A	---	---	---	---	1.45	---	---	---	---	---	1.27	---	---	---	1.74	---	---	---	1.71	---	---	---	2.39	---	---
D	---	---	1.61	---	1.27	---	---	---	1.23	---	---	---	1.07	---	---	---	0.69	---	---	---	1.60	---	---	---	1.96
LL	---	---	---	---	---	---	1.27	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.89	---	---	---
[illegible]	---	---	1.78	---	1.68	---	---	---	1.23	---	---	---	0.61	---	---	---	0.41	---	---	---	1.15	---	---	---	1.55
[illegible]	2.01	---	1.69	---	---	---	---	---	---	---	---	---	---	---	0.61	---	---	---	---	1.58	---	---	2.27	---	---
FN- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.31	---	0.30	---	1.35	---	2.57	---	---	---
FN- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.59	---	1.56	---	1.83	---	2.30	---	---	---
P- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.74	---	1.02	---	1.68	---	2.34	---	---	---	---
P- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.66	---	4.67	---	4.44	---	3.67	---	---	---	---
Test 7, Samples Taken during Cycles 22-26																									
P	1.38	---	---	---	---	---	---	2.43	---	---	---	---	---	1.87	---	---	---	---	---	1.16	---	---	---	---	---
N	1.16	---	---	---	---	---	---	2.25	---	---	1.43	---	---	---	1.14	---	---	---	1.27	---	---	---	---	---	---
NE	---	---	1.26	---	---	---	3.80	---	---	---	1.21	---	---	---	---	---	---	---	---	---	---	---	---	---	---
K	---	1.42	---	---	---	1.34	---	---	---	1.28	---	---	---	1.24	---	---	---	---	---	---	---	---	---	---	---
L	1.60	---	---	---	---	---	1.42	---	---	---	---	---	---	1.07	---	---	---	---	---	1.35	---	---	---	---	---
A	1.54	---	---	---	---	---	0.92	---	---	---	---	---	0.51	---	---	---	---	---	0.79	---	---	---	---	---	---
Z	1.69	---	---	---	---	---	1.03	---	---	---	---	---	0.4.	---	---	---	---	---	0.47	---	---	---	---	---	---
Y	---	---	---	---	1.45	---	---	---	---	---	0.92	---	---	---	---	---	0.48	---	---	---	---	---	---	1.56	---
PM	---	---	---	---	1.26	---	---	---	---	---	0.85	---	---	---	---	---	0.42	---	---	---	---	---	1.49	---	---
DP- (top)	1.81	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.76	---	2.76	---	---	---	1.61	---	---
DP- (bottom)	1.75	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.74	---	3.50	---	---	---	1.59	---	---
FF- (top)	2.24	---	---	---	1.06	---	---	---	---	---	---	---	---	---	---	---	0.65	---	1.00	---	2.78	---	1.61	---	---
FF- (bottom)	2.63	---	---	---	1.51	---	---	---	---	---	---	---	---	---	---	---	1.40	---	1.51	---	1.75	---	2.18	---	---
R- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.47	---	0.69	---	1.64	---	---	---	1.56	---
R- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.76	---	4.80	---	1.60	---	---	---	1.97	---
AA- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	0.47	---	0.26	---	0.53	---	---	---	---	---	---	---
AA- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	0.76	---	2.15	---	1.50	---	---	---	---	---	---	---
V- (top)	---	---	---	1.72	---	1.64	---	1.37	---	1.28	---	0.92	---	---	---	---	---	---	---	---	---	---	---	---	---
V- (bottom)	---	---	---	7.42	---	2.34	---	1.44	---	1.35	---	1.03	---	---	---	---	---	---	---	---	---	---	---	---	---
U- (top)	---	---	2.27	---	1.00	---	1.80	---	1.43	---	---	---	0.84	---	---	---	---	---	---	---	---	---	---	---	---
U- (bottom)	---	---	6.60	---	5.85	---	2.06	---	1.75	---	---	---	8.00	---	---	---	---	---	---	---	---	---	---	---	---
DD- (top)	---	---	---	---	---	---	---	---	---	---	---	---	0.75	---	0.68	---	0.60	---	1.07	---	---	---	---	---	---
DD- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	1.06	---	4.00	---	1.91	---	1.37	---	---	---	---	---	---

(Continued)

Table 3 (Continued)

Sampling Stations	Time in Hours																								
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
Test 8, Samples Taken during Cycles 23-26																									
P	---	1.07	---	---	---	---	---	2.36	---	---	---	---	---	2.31	---	---	---	---	---	1.12	---	---	---	---	---
N	---	1.09	---	---	---	---	---	1.34	---	---	1.45	---	---	---	1.36	---	---	---	---	1.01	---	---	---	---	---
EE	---	---	0.96	---	---	---	2.99	---	2.44	---	2.40	---	---	---	---	---	---	---	---	---	---	---	---	---	---
M	---	1.04	---	---	---	1.08	---	---	---	1.41	---	---	---	1.06	---	---	---	---	---	---	---	---	---	---	---
L	1.61	---	---	---	---	---	1.23	---	---	---	---	---	---	1.43	---	---	---	---	---	1.58	---	---	---	---	---
K	---	---	---	---	---	1.37	---	---	---	---	0.90	---	---	---	---	---	0.96	---	---	---	---	---	1.86	---	---
A	1.35	---	---	---	---	---	1.29	---	---	---	---	---	0.87	---	---	---	---	---	1.04	---	---	---	---	---	---
C	0.93	---	---	---	---	---	1.05	---	---	---	---	---	0.89	---	---	---	---	---	0.50	---	---	---	---	---	---
Y	---	---	---	---	---	1.27	---	---	1.13	---	---	---	0.50	---	---	---	0.47	---	---	---	---	---	---	1.63	---
FF	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.81	---	2.27	---	1.62	---	---	1.42
GG	---	---	---	---	1.10	---	---	---	---	---	0.53	---	---	---	---	---	---	0.57	---	---	---	---	1.25	---	---
HH- (top)	1.71	---	---	---	1.21	---	---	---	---	---	---	---	---	---	---	---	0.21	---	0.41	---	1.02	---	1.44	---	---
HH- (bottom)	1.83	---	---	---	1.18	---	---	---	---	---	---	---	---	---	---	---	0.38	---	1.07	---	1.46	---	1.49	---	---
FF- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.16	---	0.41	---	0.91	---	2.35	---	---	1.82
FF- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.74	---	2.02	---	1.18	---	1.89	---	---	2.80
F- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.56	---	0.88	---	---	1.11	---	---	1.47
R- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3.83	---	3.88	---	---	5.87	---	---	5.97
AA- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	0.36	---	0.19	---	0.38	---	---	---	---	---	---	---
AA- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	0.74	---	7.78	---	1.33	---	---	---	---	---	---	---
V- (top)	---	---	1.77	---	1.21	---	1.18	---	---	0.87	---	0.61	---	---	---	---	---	---	---	---	---	---	---	---	---
V- (bottom)	---	---	1.06	---	6.77	---	1.26	---	---	0.96	---	0.89	---	---	---	---	---	---	---	---	---	---	---	---	---
U- (top)	0.99	---	1.64	---	---	1.62	---	---	1.04	---	0.84	---	0.40	---	---	---	---	---	---	---	---	---	---	---	---
U- (bottom)	1.43	---	2.75	---	---	3.49	---	---	20.4	---	8.88	---	4.99	---	---	---	---	---	---	---	---	---	---	---	---
DD- (top)	---	---	---	---	---	---	---	---	---	---	---	---	0.82	---	0.59	---	0.76	---	0.71	---	---	---	---	---	---
DD- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	1.02	---	0.97	---	1.10	---	1.06	---	---	---	---	---	---
Test 9, Samples Taken during Cycles 23-26																									
P	---	---	---	---	1.35	---	---	---	1.43	---	---	---	2.36	---	---	---	1.47	---	---	---	1.77	---	---	---	---
N	---	---	---	---	1.14	---	---	---	2.36	---	---	---	---	1.89	---	---	1.89	---	---	---	1.68	---	---	---	---
M	---	1.43	---	---	---	1.30	---	1.47	---	1.85	---	---	---	1.89	---	---	---	1.77	---	---	---	---	---	---	---
L	1.68	---	---	---	---	---	1.01	---	---	---	---	---	1.35	---	---	---	---	---	---	1.47	---	---	---	---	---
K	1.64	---	---	---	---	---	1.18	---	---	---	---	0.80	---	---	---	---	---	---	---	1.43	---	---	---	---	---
A	---	---	0.76	---	---	---	---	---	1.31	---	---	---	---	---	---	0.80	---	---	---	---	---	1.22	---	---	---
C	---	---	---	---	0.38	---	---	---	---	---	0.67	---	---	---	0.51	---	---	---	---	---	---	---	---	1.35	---
DD	---	0.97	---	---	---	1.21	---	2.91	---	2.99	---	---	---	1.87	---	---	---	1.31	---	---	---	---	---	---	---
GG	---	1.14	---	---	---	1.27	---	4.77	---	1.90	---	---	---	0.97	---	---	---	1.73	---	---	---	---	---	---	---
FF	1.35	---	---	---	1.00	---	3.66	---	4.21	---	---	---	2.32	---	---	---	1.68	---	---	---	---	---	---	---	---
NN	1.18	---	---	---	1.05	---	4.59	---	3.92	---	3.16	---	2.27	---	---	---	---	---	---	---	---	---	---	---	---
JJ	2.41	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.59	---	3.54	---	3.33	---	3.66	---	3.37	---
Y	---	---	0.88	---	---	---	---	---	1.56	---	---	---	---	---	---	0.93	---	---	---	---	---	1.18	---	---	---
KK	1.64	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.21	---	0.51	---	4.63	---	2.19	---	2.32	---
LL	---	---	---	---	---	---	---	---	---	---	---	0.55	---	---	---	---	0.88	---	1.05	---	2.82	---	2.57	---	3.20
TT	---	---	---	---	---	---	---	---	---	---	0.55	---	---	---	---	---	0.13	---	0.42	---	3.96	---	2.32	---	2.44
MM- (top)	1.14	---	---	---	1.81	---	8.46	---	5.22	---	3.58	---	2.23	---	---	---	---	---	---	---	---	---	---	---	---
MM- (bottom)	1.01	---	---	---	1.09	---	9.14	---	3.75	---	4.08	---	2.78	---	---	---	---	---	---	---	---	---	---	---	---
EE- (top)	---	0.92	---	1.64	---	8.34	---	5.31	---	10.96	---	2.79	---	2.11	---	---	---	---	---	---	---	---	---	---	---
EE- (bottom)	---	1.18	---	1.35	---	19.7	---	1.22	---	8.[illegible]	---	6.27	---	5.31	---	---	---	---	---	---	---	---	---	---	---
BB- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.55	---	1.47	---	6.44	---	5.22	---	8.13	---	1.31
BB- (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.76	---	14.23	---	16.9	---	17.5	---	17.5	---	12.68

(Continued)

Table 3 (Continued)

Sampling Stations	Time in Hours																								
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
Test 10, Samples Taken during Cycles 28-31																									
P	---	---	---	---	1.49	---	---	---	1.44	---	---	---	2.01	---	---	---	1.93	---	---	---	1.87	---	---	---	---
N	---	---	---	---	1.35	---	---	---	3.19	---	---	---	---	1.33	---	---	1.74	---	---	---	1.78	---	---	---	---
DD	---	---	---	---	---	1.61	---	2.88	---	2.48	---	---	---	1.96	---	---	---	1.00	---	---	---	---	---	---	---
M	---	1.57	---	---	---	1.64	---	1.68	---	1.72	---	---	---	1.50	---	---	---	1.69	---	---	---	---	---	1.53	---
SS	---	1.35	---	---	---	---	---	3.42	---	2.38	---	---	---	1.39	---	---	---	1.59	---	---	---	---	---	---	---
L	---	1.73	---	---	---	---	1.63	---	---	---	---	---	1.45	---	---	---	---	---	---	1.57	---	---	---	---	---
FF	1.82	---	---	---	1.69	---	3.12	---	3.54	---	---	---	2.13	---	---	---	1.44	---	---	---	---	---	---	---	---
K	---	1.67	---	---	---	---	1.69	---	---	---	---	1.41	---	---	---	---	---	---	---	3.67	---	---	---	---	---
KK	1.30	---	---	---	1.84	---	4.26	---	2.62	---	2.63	---	1.82	---	---	---	---	---	---	---	---	---	---	---	---
Y	---	---	---	1.22	---	---	---	---	1.81	---	---	---	---	---	---	1.17	---	---	---	---	---	1.61	---	---	---
A	---	---	---	1.50	---	---	---	---	1.49	---	---	---	---	---	---	1.38	---	---	---	---	---	1.62	---	---	---
D	---	---	---	---	4.37	---	---	---	---	---	1.11	---	---	---	0.76	---	---	---	---	---	---	---	---	1.35	---
JJ	2.91	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.27	---	2.09	---	1.58	---	2.73	---	2.68	---
KK	2.65	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.39	---	0.34	---	5.33	---	2.78	---	2.60	---
LL	---	---	---	---	---	---	---	---	---	---	---	0.85	---	---	---	---	0.25	---	1.88	---	2.84	---	2.39	---	2.43
TT	---	---	---	---	---	---	---	---	---	---	0.86	---	---	---	---	---	0.35	---	0.45	---	2.11	---	1.68	---	1.81
MM- (top)	1.47	---	---	---	1.73	---	3.36	---	2.03	---	1.96	---	1.01	---	---	---	---	---	---	---	---	---	---	---	---
MM- (bottom)	1.55	---	---	---	2.15	---	8.13	---	3.45	---	3.15	---	3.14	---	---	---	---	---	---	---	---	---	---	---	---
RR- (top)	---	1.33	---	1.47	---	2.01	---	1.72	---	1.52	---	1.01	---	0.86	---	---	---	---	---	---	---	---	---	---	---
RR- (bottom)	---	1.52	---	2.25	---	42.3	---	5.28	---	9.80	---	7.60	---	6.32	---	---	---	---	---	---	---	---	---	---	---
HH- (top)	---	---	1.72	---	---	---	---	---	---	---	---	---	---	---	0.28	---	1.14	---	0.98	---	1.29	---	1.56	---	1.67
HH- (bottom)	---	---	2.43	---	---	---	---	---	---	---	---	---	---	---	0.34	---	1.77	---	26.5	---	10.22	---	6.97	---	7.08
Test 11, Samples Taken during Cycles 27-30																									
F	[illegible]	---	---	---	1.83	---	---	---	---	---	3.25	---	---	---	2.63	---	---	---	2.34	---	---	---	2.21	---	---
N	[illegible]	---	---	---	1.76	---	---	---	---	2.72	---	---	---	---	1.78	---	---	---	1.50	---	---	---	1.92	---	---
DD	[illegible]	---	---	1.87	---	2.12	---	---	3.85	---	---	---	3.05	---	---	1.58	---	---	---	---	2.22	---	---	---	---
M	[illegible]	1.23	---	---	---	2.58	---	2.83	---	2.90	---	---	---	3.29	---	---	---	2.67	---	---	---	---	---	2.09	---
SS	---	1.78	---	---	---	2.67	---	4.92	---	3.52	---	---	---	2.96	---	---	---	2.42	---	---	---	---	---	---	---
L	---	2.07	---	---	---	---	2.46	---	---	---	---	---	2.72	---	---	---	---	---	---	2.93	---	---	---	---	---
FF	2.28	---	---	---	1.79	---	[illegible]	---	4.06	---	---	---	2.77	---	---	---	2.23	---	---	---	---	---	---	---	---
K	---	2.14	---	---	---	---	2.51	---	---	---	---	2.72	---	---	---	---	---	---	---	2.80	---	---	---	---	---
KK	2.18	---	---	---	2.50	---	6.73	---	4.77	---	---	---	3.55	---	---	---	2.27	---	---	---	---	---	---	---	---
E	---	---	---	2.37	---	---	---	---	2.73	---	---	---	---	---	---	2.73	---	---	---	---	---	2.50	---	---	---
A	---	---	---	2.19	---	---	---	---	2.59	---	---	---	---	---	---	2.00	---	---	---	---	---	2.51	---	---	---
D	---	---	---	---	2.50	---	---	---	---	---	2.46	---	---	---	---	---	1.72	---	---	---	---	---	---	2.76	---
JJ	4.64	---	---	3.21	---	2.98	---	---	---	---	---	---	---	---	---	0.94	---	6.78	---	5.15	---	4.48	---	4.11	---
KK	3.40	---	---	2.85	---	3.22	---	---	---	---	---	---	---	---	---	0.78	---	1.62	---	5.64	---	4.85	---	4.11	---
LL	---	---	2.98	---	---	---	---	2.68	---	---	---	---	---	---	0.80	---	---	---	2.67	---	5.45	---	---	---	2.77
TT	---	---	3.05	---	---	---	---	2.82	---	---	---	---	---	---	0.38	---	---	---	0.70	---	3.51	---	---	---	3.24
MM- (top)	2.03	---	---	---	4.21	---	5.48	---	4.38	---	3.96	---	3.25	---	---	---	1.94	---	---	---	---	---	---	---	---
MM- (bottom)	1.89	---	---	---	3.62	---	6.61	---	5.57	---	4.74	---	4.55	---	---	---	2.76	---	---	---	---	---	---	---	---
RR- (top)	---	1.96	---	3.31	---	5.67	---	3.94	---	5.45	---	2.96	---	2.58	---	---	---	1.96	---	2.28	---	---	---	---	---
RR- (bottom)	---	1.81	---	4.54	---	21.4	---	10.85	---	10.45	---	9.51	---	7.62	---	---	---	2.41	---	2.02	---	---	---	---	---
HH- (top)	---	---	2.19	---	---	---	2.70	---	---	---	---	---	---	---	1.32	---	2.90	---	5.12	---	2.77	---	2.26	---	2.77
HH- (bottom)	---	---	3.85	---	---	---	2.63	---	---	---	---	---	---	---	1.42	---	7.72	---	6.42	---	6.92	---	17.6	---	15.9

(Continued)

Table 3 (Continued)

Sampling Stations	Time in Hours																								
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
Test 12, Samples Taken during Cycles 27-30																									
VV	---	---	---	---	---	---	1.27	---	---	1.55	---	---	---	---	1.27	---	---	---	---	---	---	---	0.91	---	---
N	---	0.83	---	---	1.21	---	1.37	---	1.60	---	---	---	2.05	---	---	---	---	---	1.18	---	---	---	---	---	---
C	---	---	---	---	---	1.87	---	---	---	3.38	---	---	---	---	3.15	---	---	---	---	---	---	---	1.00	---	---
FE	---	0.95	0.92	---	5.78	---	---	4.44	[illegible]	---	---	---	3.38	---	---	---	---	---	1.18	---	---	---	---	---	---
L	1.57	---	---	---	---	---	1.54	---	---	---	---	1.58	---	---	---	---	---	---	2.64	---	---	---	---	---	---
K	1.43	---	---	---	---	---	1.63	---	---	---	---	1.45	---	---	---	---	---	---	2.38	---	---	---	---	---	---
Y	---	---	---	---	---	1.13	---	1.27	---	---	---	---	---	0.62	---	---	---	---	---	---	---	---	---	---	1.46
A	---	---	1.49	---	---	---	---	---	---	1.40	---	---	---	---	1.21	---	---	---	---	---	---	1.48	---	---	---
D	---	---	1.55	---	---	---	---	---	---	1.13	---	---	---	---	0.60	---	---	---	---	---	---	1.33	---	---	---
Z	---	---	---	---	1.10	---	---	---	0.88	---	---	---	0.38	---	---	---	---	---	---	---	1.33	---	---	---	---
LL	---	---	---	---	1.30	---	---	---	1.54	---	---	---	0.35	---	---	---	---	---	---	---	0.69	---	---	---	---
MM	---	---	---	---	---	---	---	---	---	0.62	---	---	---	0.21	---	---	---	1.15	---	0.71	---	0.88	---	---	---
NN	1.42	---	---	---	---	---	---	---	---	1.42	---	---	---	---	---	0.33	---	1.01	---	1.36	---	1.48	---	1.78	---
UD (top)	---	---	1.42	---	1.49	---	1.86	---	1.63	---	---	---	1.06	---	---	---	---	---	---	---	0.86	---	---	---	---
UD (bottom)	---	---	0.89	---	1.51	---	1.34	---	2.17	---	---	---	3.11	---	---	---	---	---	---	---	1.09	---	---	---	---
M (top)	1.01	---	---	1.69	---	1.52	---	1.71	---	1.93	---	1.58	---	1.52	---	---	---	---	---	---	---	1.15	---	---	---
M (bottom)	0.97	---	---	2.19	---	1.51	---	4.23	---	4.60	---	3.85	---	2.34	---	---	---	---	---	---	---	0.91	---	---	---
SS (top)	---	---	---	1.48	1.16	---	0.94	---	1.13	---	1.01	---	0.54	---	---	0.83	---	---	---	---	---	---	---	1.07	---
SS (bottom)	---	---	---	18.4	20.5	---	23.1	---	33.7	---	19.8	---	[illegible]	---	---	1.87	---	---	---	---	---	---	---	1.22	---
R (top)	0.95	---	1.45	---	---	---	---	---	---	---	---	---	---	---	0.30	---	0.35	---	0.71	---	---	---	---	---	0.89
R (bottom)	2.04	---	1.31	---	---	---	---	---	---	---	---	---	---	---	0.54	---	4.26	---	1.15	---	---	---	---	---	3.41
FF (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.26	---	1.03	---	1.07	---	0.92	---	1.18	---	1.09
FF (bottom)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	0.47	---	1.39	---	2.67	---	2.05	---	3.55	---	2.55
Test 13, Samples Taken during Cycles 27-31																									
VV	---	---	---	---	---	---	---	2.53	---	---	2.82	---	---	---	2.24	---	---	---	---	---	---	2.05	---	---	---
P	---	---	---	---	---	2.47	---	---	---	3.56	---	---	---	2.98	---	---	---	---	---	---	---	---	2.41	---	---
N	2.07	- -	---	---	---	3.59	---	2.85	---	2.98	---	---	---	2.40	---	---	---	---	---	---	---	---	2.54	---	---
L	---	3.01	---	---	---	---	3.88	---	---	---	---	3.41	---	---	---	---	---	---	4.43	---	---	---	---	---	---
K	---	3.06	---	---	---	---	4.06	---	---	---	---	2.92	---	---	---	---	---	---	3.51	---	---	---	---	---	---
KK	3.59	---	---	---	---	---	---	---	---	---	2.01	---	---	---	---	0.94	---	2.15	---	3.60	---	4.41	---	3.80	---
Y	---	---	---	---	---	3.46	---	[illegible]	---	---	---	---	---	1.49	---	---	---	---	---	---	---	---	---	---	2.90
A	---	---	[illegible]	---	---	---	---	---	---	2.82	---	---	---	---	2.22	---	---	---	---	---	---	3.91	---	---	---
Z	---	---	---	---	3.15	---	---	---	2.43	---	---	---	1.00	---	---	---	---	---	---	---	2.49	---	---	---	---
D	---	---	4.17	---	---	---	---	---	2.80	---	---	---	---	---	1.47	---	---	---	---	---	---	2.21	---	---	---
MM	---	---	---	---	---	---	---	---	---	---	1.51	---	---	0.75	---	0.51	---	1.88	---	2.80	---	2.95	---	---	---
LL	---	---	---	---	3.51	---	---	---	1.93	---	---	---	0.82	---	---	---	---	---	---	---	[illegible]	---	---	---	---
R (top)	3.21	---	3.15	---	---	---	---	---	---	---	---	---	---	---	0.76	---	0.93	---	1.85	---	---	---	2.56	---	2.35
R (bottom)	3.67	---	3.84	---	---	---	---	---	---	---	---	---	---	---	1.37	---	8.31	---	2.38	---	---	---	4.27	---	4.42
UU (top)	---	2.21	2.07	---	2.88	---	2.93	---	3.05	---	---	---	2.25	---	---	---	---	---	---	2.20	---	---	---	---	---
UU (bottom)	---	1.78	2.10	---	3.25	---	4.32	---	3.59	---	---	---	2.48	---	---	---	---	---	---	2.25	---	---	---	---	---
DD (top)	---	---	2.37	---	[illegible]	---	[illegible]	---	2.54	---	---	---	1.16	---	---	---	---	---	---	---	2.19	---	---	---	---
DD (bottom)	---	---	2.20	---	3.51	---	7.45	---	4.84	---	---	---	4.27	---	---	---	---	---	---	---	2.33	---	---	---	---
M (top)	2.43	---	---	2.77	---	2.62	---	2.26	---	2.38	---	2.20	---	1.44	---	---	---	---	---	---	---	2.46	---	---	---
M (bottom)	2.39	---	---	2.72	---	[illegible]	---	2.17	---	2.68	---	2.37	---	2.14	---	---	---	---	---	---	---	2.30	---	---	---
SS (top)	---	---	---	2.90	2.52	---	2.52	---	[illegible]	---	2.41	---	1.38	---	---	2.58	---	---	---	---	---	---	---	2.62	---
SS (bottom)	---	---	---	44.3	65.3	---	55.7	---	[illegible]	---	42.1	---	5.92	---	---	5.98	---	---	---	---	---	---	---	3.85	---
FF (top)	---	4.27	---	---	---	---	---	---	---	---	---	---	---	---	0.96	---	1.38	---	2.63	---	3.57	---	2.96	---	4.25
FF (bottom)	---	1.41	---	---	---	---	---	---	---	---	---	---	---	---	1.86	---	4.21	---	6.36	---	6.63	---	4.04	---	3.95

(Continued)

Table 3 (Continued)

Sampling Stations	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
												Time in Hours													
Test 14, Samples Taken during Cycles 26-31																									
VV	---	---	---	---	---	3.95	---	---	---	---	---	5.11	---	---	---	---	2.68	---	---	---	---	---	---	---	2.28
P	---	---	---	3.46	---	---	---	---	6.44	---	---	---	6.08	---	---	---	5.88	---	---	---	3.97	---	---	---	3.34
F	---	2.90	---	---	---	---	5.07	---	---	---	---	6.14	---	---	2.92	---	---	---	3.34	---	---	---	---	---	---
EE	---	3.20	---	---	---	7.83	7.41	---	6.74	---	---	---	4.47	---	---	---	---	---	3.74	---	---	---	---	---	---
L	---	---	---	4.23	---	---	---	---	---	3.87	---	---	---	---	---	4.17	---	---	---	---	---	4.92	---	---	---
K	---	---	---	4.27	---	---	---	---	---	3.91	---	---	---	---	---	3.06	---	---	---	---	---	5.02	---	---	---
KK	---	---	---	---	3.70	---	---	---	---	---	3.34	---	---	---	1.95	---	1.23	---	3.85	---	3.65	---	---	---	4.57
A	---	---	3.76	---	---	---	---	---	4.31	---	---	---	---	---	2.56	---	---	---	---	---	4.31	---	---	---	---
D	---	---	4.57	---	---	---	---	---	3.56	---	---	---	---	---	1.79	---	---	---	---	---	2.94	---	---	---	---
JJ	4.93	---	---	4.27	---	---	---	---	---	---	2.14	---	---	---	0.85	---	---	---	4.71	---	4.13	---	---	---	---
XX	2.67	---	---	3.78	---	---	---	---	---	---	2.07	---	---	---	0.89	---	---	---	3.26	---	4.32	---	4.59	---	---
LL	4.13	---	---	---	3.78	---	---	---	---	---	---	---	---	---	---	0.66	---	---	---	3.54	---	4.17	---	4.41	---
TT	4.21	---	---	---	---	3.10	---	---	---	---	---	---	---	---	---	0.56	---	---	---	1.45	---	3.12	---	4.03	---
[illegible]- (top)	---	---	3.95	---	4.07	---	---	4.59	---	---	3.93	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[illegible]- (bottom)	---	---	2.95	---	5.50	---	---	14.64	---	---	11.25	---	---	---	4.41	---	---	---	---	---	3.34	---	---	---	---
[illegible] (top)	3.14	---	3.77	---	3.64	---	3.93	---	4.09	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
H- (bottom)	3.28	---	3.87	---	4.21	---	4.67	---	4.51	---	---	---	3.82	---	---	---	5.36	---	---	---	3.70	---	---	---	---
[illegible]- (top)	---	4.51	---	3.64	---	3.92	---	4.67	---	3.82	---	3.12	---	2.54	---	---	---	---	---	---	---	---	---	---	---
[illegible]- (bottom)	---	3.13	---	18.4	---	70.4	---	64.3	---	13.09	---	10.89	---	6.58	---	---	---	---	3.42	---	---	---	---	---	3.48
[illegible]- (top)	4.21	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.94	---	3.62	---	3.64	---	3.20	---
[illegible]- (bottom)	4.29	---	---	---	3.62	---	---	---	---	---	3.82	---	2.88	---	2.36	---	---	4.69	---	6.10	---	4.77	---	4.69	---
MM- (top)	---	---	---	---	---	4.37	---	3.54	---	3.24	---	2.62	---	1.77	---	---	---	---	---	---	---	---	---	---	---
MM- (bottom)	---	---	3.58	---	---	6.16	---	3.08	---	4.17	---	3.12	---	2.56	---	---	2.07	---	---	---	---	---	4.49	---	---
[illegible]- (top)	---	---	3.77	---	4.21	---	3.48	---	2.98	---	2.03	---	1.39	---	---	---	---	---	---	---	---	---	---	---	---
[illegible]- (bottom)	---	---	3.85	---	7.85	---	9.28	---	7.89	---	6.50	---	5.24	---	3.36	---	---	---	---	---	---	---	3.54	---	---
[illegible]- (top)	---	4.33	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.61	---	2.82	---	3.22	---	---	3.80
[illegible]- (bottom)	---	5.58	4.65	---	---	---	---	---	---	---	---	---	---	---	---	1.25	---	15.2	---	9.28	---	8.58	---	---	6.82
Test 15, Samples Taken during Cycles 27-31																									
VV	---	---	---	---	---	2.36	---	---	---	---	---	3.24	---	---	---	---	1.41	---	---	---	---	---	---	---	1.81
P	---	---	---	---	---	2.23	---	---	2.66	---	---	---	3.67	---	---	---	2.76	---	---	---	2.20	---	---	---	2.02
F	---	---	---	2.14	---	---	---	0.41	---	---	---	3.16	---	---	1.08	---	---	---	2.01	---	---	---	---	---	---
EE	---	---	---	2.36	---	2.72	---	4.44	1.07	---	---	---	3.54	---	---	---	---	---	2.29	---	---	---	---	---	---
L	---	---	---	2.58	---	---	---	---	---	2.46	---	---	---	---	---	2.85	---	---	---	---	---	---	3.21	---	---
K	---	---	---	2.65	---	---	---	---	---	2.30	---	---	---	---	---	2.03	---	---	---	---	---	---	2.54	---	---
A	---	---	2.23	---	---	---	---	---	2.38	---	---	---	---	---	1.40	---	---	---	---	---	2.90	---	---	---	---
D	---	---	2.9[illegible]	---	---	---	---	---	1.83	---	---	---	---	---	0.71	---	---	---	---	---	1.74	---	---	---	---
LL	2.77	---	---	---	---	2.35	---	---	---	---	---	---	---	---	---	0.22	---	---	---	2.31	---	3.12	---	2.94	---
TT	2.48	---	---	---	---	2.07	---	---	---	---	---	---	---	---	---	0.18	---	---	---	0.79	---	2.85	---	2.51	---
KK	2.70	---	---	2.59	---	---	---	---	---	---	0.96	---	---	---	0.39	---	---	---	2.16	---	3.60	---	2.95	---	---
JJ	2.84	---	---	2.74	---	---	---	---	---	---	0.99	---	---	---	0.28	---	---	---	4.66	---	3.70	---	---	---	---
[illegible]	---	---	---	---	2.51	---	---	---	---	1.99	---	2.[illegible]	---	---	1.04	---	0.68	---	2.12	---	2.71	---	---	---	2.71
[illegible] (top)	---	2.33	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.04	---	1.80	---	2.90	---	---	2.29
[illegible] (bottom)	---	3.76	---	2.87	---	---	---	---	---	---	---	0.96	---	---	---	---	---	33.1	---	13.6	---	15.6	---	---	12.6
[illegible] (top)	---	---	2.72	---	1.80	---	1.99	---	---	---	2.59	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	---	1.07	---	2.48	---	1.99	---	---	---	4.71	---	---	---	4.51	---	---	---	---	---	1.87	---	---	---	---
[illegible] (top)	1.95	---	2.53	---	2.27	---	2.73	---	2.67	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	1.91	---	2.55	---	2.38	---	2.73	---	2.78	---	---	---	2.50	---	---	---	3.17	---	---	---	1.89	---	---	---	---
[illegible] (top)	---	2.52	---	1.[illegible]	---	[illegible].70	---	3.49	---	2.62	---	1.[illegible]	---	1.27	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	4.26	---	3.77	---	20.1	---	32.2	---	55.8	---	[illegible]	---	42.1	---	---	---	---	2.16	---	---	---	---	---	1.93
[illegible] (top)	2.48	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.97	---	2.81	---	3.08	---	1.89	---
[illegible] (bottom)	2.92	---	---	---	2.43	---	---	---	---	---	2.22	---	1.97	---	2.70	---	---	3.35	---	3.59	---	3.73	---	3.89	---
[illegible] (top)	---	---	---	---	---	[illegible].97	---	3.29	---	2.70	---	2.49	---	1.29	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	---	---	1.51	---	5.18	---	5.23	---	3.32	---	2.55	---	1.80	---	---	1.29	---	---	---	---	---	2.39	---	---
[illegible] (top)	---	---	2.29	---	2.43	---	2.23	---	2.65	---	1.32	---	0.67	---	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	---	2.52	---	8.[illegible]9	---	17.6	---	10.0	---	5.00	---	5.04	---	---	1.58	---	---	---	---	---	---	---	1.97	---

(Continued)

Table 3 (Continued)

Sampling Stations	Time in Hours																								
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
Test 16, Samples Taken during Cycles 27-32																									
VV	---	---	---	---	---	2.61	---	---	---	---	---	3.91	---	---	---	---	1.52	---	---	---	---	---	---	---	1.72
F	2.59	---	---	---	---	3.72	---	---	4.09	---	---	---	5.55	---	---	---	4.39	---	---	---	---	---	---	---	---
N	---	---	---	1.93	---	---	---	2.78	---	---	---	3.07	---	---	3.11	---	---	---	2.93	---	---	---	---	---	---
EE	---	---	---	3.63	---	5.63	---	2.77	6.62	---	---	---	3.57	---	---	---	---	---	2.54	---	---	---	---	---	---
L	---	---	---	3.18	---	---	---	---	---	3.25	---	---	---	---	---	3.25	---	---	---	---	---	3.35	---	---	---
Y	---	---	---	2.21	---	---	---	---	---	3.18	---	---	---	---	---	2.28	---	---	---	---	---	3.93	---	---	---
A	---	---	2.97	---	---	---	---	---	2.21	---	---	---	---	---	2.43	---	---	---	---	---	1.02	---	---	---	---
D	---	---	3.02	---	---	---	---	---	3.07	---	---	---	---	---	2.06	---	---	---	---	---	2.55	---	---	---	---
LL	3.95	---	---	---	---	2.95	---	---	---	---	---	---	---	---	---	1.78	---	---	---	2.57	---	3.54	---	2.29	---
[illegible]	3.52	---	---	---	---	3.05	---	---	---	---	---	---	---	---	---	1.60	---	---	---	2.33	---	2.15	---	3.58	---
[illegible]	3.61	---	---	2.59	---	---	---	---	---	---	2.80	---	---	---	1.66	---	---	---	2.57	---	3.12	---	3.90	---	---
JJ	4.35	---	---	2.49	---	---	---	---	---	---	2.91	---	---	---	1.8[illegible]	---	---	---	3.75	---	3.86	---	4.13	---	---
[illegible]	---	---	---	---	4.48	---	---	---	3.52	---	---	3.22	---	---	2.40	---	1.92	---	3.57	---	3.04	---	---	---	3.35
[illegible] (top)	---	2.90	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.15	---	2.91	---	3.27	---	---	3.36
[illegible] (bottom)	---	3.84	---	3.48	---	---	---	---	---	---	---	3.35	---	---	---	---	---	6.21	---	6.08	---	2.73	---	---	[illegible]
[illegible] (top)	---	---	2.71	---	2.51	---	4.03	---	---	---	3.18	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	---	2.00	---	9.55	---	[illegible]	---	---	---	4.14	---	---	---	4.54	---	---	---	---	---	2.55	---	---	---	---
M (top)	2.27	--	3.39	---	2.10	---	[illegible]	---	3.05	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
M (bottom)	1.93	---	3.14	---	2.83	---	3.47	---	3.44	---	---	---	2.63	---	---	---	2.97	---	---	---	2.67	---	---	---	---
[illegible] (top)	---	2.99	---	3.04	---	2.97	---	3.27	---	2.83	---	2.54	---	2.36	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	1.80	---	62.0	---	52.6	---	55.7	---	65.8	---	34.0	---	13.2	---	---	---	---	3.07	---	---	---	---	---	2.15
[illegible] (top)	3.79	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.92	---	3.35	---	3.24	---	3.01	---
[illegible] (bottom)	2.53	---	---	---	2.80	---	---	---	---	---	3.20	---	2.73	---	2.38	---	---	7.21	---	6.14	---	5.48	---	3.54	---
[illegible] (top)	---	---	---	---	---	3.24	---	3.36	---	3.09	---	2.66	---	2.41	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	---	3.48	---	---	2.98	---	3.54	---	3.21	---	3.15	---	2.81	---	---	2.99	---	---	---	3.44	---	---	---	---
FF (top)	---	---	3.20	---	3.29	---	2.57	---	2.94	---	2.28	---	2.49	---	---	---	---	---	---	---	---	---	---	---	---
FF (bottom)	2.33	---	2.38	---	6.13	---	6.04	---	4.59	---	4.11	---	4.45	---	---	2.92	---	---	---	---	---	---	---	---	---
Test 17, Samples Taken during Cycles 27-32																									
VV	---	---	---	---	---	3.30	---	---	---	---	---	2.62	---	---	---	2.47	---	---	---	---	---	---	---	---	2.35
F	---	2.47	---	---	---	3.28	---	---	4.50	---	---	---	4.08	---	---	---	4.13	---	---	---	---	---	---	---	---
N	---	---	---	3.21	---	---	---	3.03	---	---	---	2.65	---	---	3.02	---	---	---	2.69	---	---	---	---	---	---
EE	---	---	---	3.37	---	6.80	---	5.17	---	3.99	---	---	3.36	---	---	---	---	---	2.76	---	---	---	---	---	---
L	---	---	---	[illegible]	---	---	---	---	---	2.71	---	---	---	---	---	---	3.38	---	---	---	.	---	2.88	---	---
K	---	---	---	---	---	---	3.20	---	---	---	2.92	---	---	---	---	---	---	---	3.81	---	---	---	---	---	---
[illegible]	---	---	---	---	3.13	---	---	---	2.88	---	---	---	2.14	---	---	---	1.50	---	2.37	---	2.63	---	---	---	3.27
Y	---	---	---	---	---	---	3.15	---	---	---	2.67	---	---	---	---	---	---	---	3.86	---	---	---	---	---	---
A	---	---	3.16	---	---	---	---	---	2.93	---	---	---	---	---	2.02	---	---	---	---	---	3.87	---	---	---	---
[illegible]	---	---	---	---	3.23	---	---	---	---	2.26	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
D	---	---	1.57	---	---	---	---	---	2.59	---	---	---	---	---	1.54	---	---	---	---	---	2.13	---	---	---	---
[illegible]	4.15	---	---	3.47	---	---	---	---	---	---	1.60	---	---	---	0.54	---	---	---	3.26	---	3.55	---	3.70	---	---
[illegible]	3.57	---	---	3.07	---	---	---	---	---	---	1.41	---	---	---	0.49	---	---	---	3.34	---	3.06	---	3.19	---	---
[illegible]	3.71	---	---	---	---	2.96	---	---	---	---	---	---	---	---	---	0.43	---	---	---	2.52	---	2.88	---	3.17	---
[illegible]	2.29	---	---	---	---	2.48	---	---	---	---	---	---	---	---	---	0.33	---	---	---	1.70	---	1.95	---	2.94	---
[illegible] (top)	---	---	2.83	---	3.29	---	4.09	---	---	---	3.01	---	---	---	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	---	[illegible]	---	6.71	---	4.47	---	---	---	5.12	---	---	---	3.36	---	---	---	---	---	2.62	---	---	---	---
M (top)	2.75	---	1.59	---	3.07	---	3.36	---	2.77	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
M (bottom)	2.63	---	3.40	---	3.19	---	3.72	---	2.94	---	---	---	2.67	---	---	---	3.38	---	---	---	2.73	---	---	---	---
[illegible] (top)	---	3.41	---	3.17	---	3.34	---	---	---	2.79	---	2.56	---	2.20	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	3.07	---	7.76	---	6.66	---	---	---	23.6	---	13.10	---	7.84	---	3.54	---	---	---	---	2.61	---	---	---	2.91
[illegible] (top)	3.20	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.22	---	2.74	---	2.77	---	3.04	---
[illegible] (bottom)	6.31	---	---	---	2.56	---	---	---	---	---	2.62	---	2.27	---	2.00	---	---	1.24	---	3.16	---	5.21	---	5.73	---
[illegible] (top)	---	---	---	---	---	3.63	---	3.44	---	2.27	---	2.92	---	1.55	---	---	---	---	---	---	---	---	---	---	---
[illegible] (bottom)	---	---	2.66	---	---	4.00	---	4.25	---	3.32	---	2.63	---	2.42	---	---	1.61	---	---	---	---	[illegible]	---	---	---
[illegible] (top)	---	---	[illegible]	---	2.54	---	2.96	---	2.55	---	1.69	---	0.99	---	---	---	---	---	---	---	---		---	---	---
[illegible] (bottom)	---	2.03	2.42	---	14.06	---	6.00	---	6.77	---	5.47	---	4.99	---	---	---	1.81	---	---	---	---		---	---	---
[illegible] (top)	---	3.34	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	1.54	---	2.00	---		---	---	3.12
[illegible] (bottom)	---	16.35	---	---	3.40	---	---	---	---	---	---	1.47	---	---	---	---	---	6.93	---	7.37	---		---	---	7.57

(Continued)

Table 3 (Continued)

Sampling Stations	Time in Hours																								
	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
	Test 18, Samples Taken during Cycles 27-32																								
VV	---	---	---	---	---	3.83	---	---	---	---	---	4.53	---	---	---	2.67	---	---	---	---	---	---	---	---	2.77
P	---	2.84	---	---	---	5.09	---	---	5.02	---	---	---	6.13	---	---	---	5.04	---	---	---	---	---	---	---	---
N	---	---	---	3.89	---	---	---	4.40	---	---	---	4.30	---	---	2.23	---	---	---	3.18	---	---	---	---	---	---
FF	---	---	---	---	---	---	---	---	---	---	---	---	6.18	6.76	6.62	5.89	5.26	---	---	---	---	---	---	---	---
L	---	---	---	---	4.48	---	---	---	---	---	5.01	---	---	---	---	---	5.30	---	---	---	---	---	5.65	---	---
K	---	---	---	---	5.48	---	---	---	---	---	5.17	---	---	---	---	---	6.78	---	---	---	---	---	5.75	---	---
NP	---	---	---	---	---	7.65	6.39	---	3.75	---	---	3.76	---	---	---	---	4.18	---	---	---	3.51	---	---	---	4.19
H	---	---	---	---	---	---	4.78	---	---	---	---	---	4.24	---	---	---	---	---	6.50	---	---	---	---	---	[illegible]
A	---	---	---	---	---	---	4.75	---	---	---	---	---	4.61	---	---	---	---	---	6.01	---	---	---	---	---	[illegible]
D	---	---	6.01	---	---	---	---	---	4.75	---	---	---	---	---	2.75	---	---	---	---	---	5.35	---	---	---	---
JJ	5.76	---	---	3.70	---	---	---	---	---	---	2.34	---	---	---	1.08	---	---	---	7.31	---	5.22	---	4.79	---	---
KK	4.84	---	---	4.12	---	---	---	---	---	---	2.56	---	---	---	0.91	---	---	---	7.15	---	5.59	---	4.77	---	---
LL	4.38	---	---	---	---	4.07	---	---	---	---	---	---	---	---	---	0.55	---	---	---	5.41	---	4.50	---	4.25	---
TT	4.41	---	---	---	---	3.97	---	---	---	---	---	---	---	---	---	0.58	---	---	---	5.14	---	4.59	---	4.73	---
DD- (top)	---	---	3.85	---	3.79	---	6.63	---	---	---	6.46	---	---	---	4.15	---	---	---	---	---	---	---	---	---	---
DD- (bottom)	---	---	3.28	---	4.40	---	5.09	---	---	---	4.44	---	---	---	6.62	---	---	---	---	---	3.64	---	---	---	---
EE- (top)	---	---	---	---	---	7.15	---	---	---	6.91	---	---	7.43	7.16	5.77	6.95	---	---	---	---	---	---	---	---	---
EE- (bottom)	---	---	---	6.58	---	6.58	---	8.35	---	7.55	---	---	7.14	7.32	6.64	6.10	5.47	---	---	---	---	3.59	---	---	---
HH- (top)	4.20	---	---	---	4.23	---	4.89	---	4.85	---	---	---	4.93	5.49	6.77	6.05	5.87	---	---	---	---	---	---	---	---
HH- (bottom)	3.44	---	---	---	5.07	---	5.01	---	5.18	---	---	---	4.97	5.39	7.16	6.10	5.46	---	---	---	3.72	---	---	---	---
GG- (top)	---	4.54	---	3.95	---	5.13	---	4.97	---	4.88	---	4.45	---	4.09	---	---	---	---	---	---	---	---	---	---	---
GG- (bottom)	---	12.59	---	50.0	---	53.1	---	62.1	---	82.4	---	88.9	---	73.2	---	---	---	---	4.04	---	3.74	---	---	---	---
II- (top)	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	3.19	---	8.15	---	3.59	---	4.03	---	4.12	---
II- (bottom)	---	---	---	---	3.88	---	---	---	---	---	4.47	---	---	---	2.18	10.27	---	8.64	---	5.34	---	7.24	---	4.31	---
MM- (top)	---	---	---	---	---	8.90	---	5.44	---	4.79	---	3.79	---	3.27	---	---	---	---	---	---	---	---	---	---	---
MM- (bottom)	3.72	---	---	---	---	5.37	---	6.35	---	6.13	---	4.72	---	3.64	---	---	2.60	---	---	---	---	---	3.75	---	---
PP- (top)	---	---	5.83	---	4.77	---	4.06	---	3.68	---	4.16	---	2.16	---	---	---	---	---	---	---	---	---	---	---	---
PP- (bottom)	3.51	---	5.06	---	3.59	---	11.05	---	10.07	---	8.16	---	7.47	---	---	---	2.08	---	---	---	---	---	---	---	---
[illegible]- (top)	---	4.15	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	4.20	---	3.78	---	3.60	---	---	3.85
[illegible]- (bottom)	---	5.35	---	4.93	---	---	---	---	---	---	---	2.36	---	---	---	---	---	27.9	---	12.59	---	32.8	---	---	[illegible]

Table 4

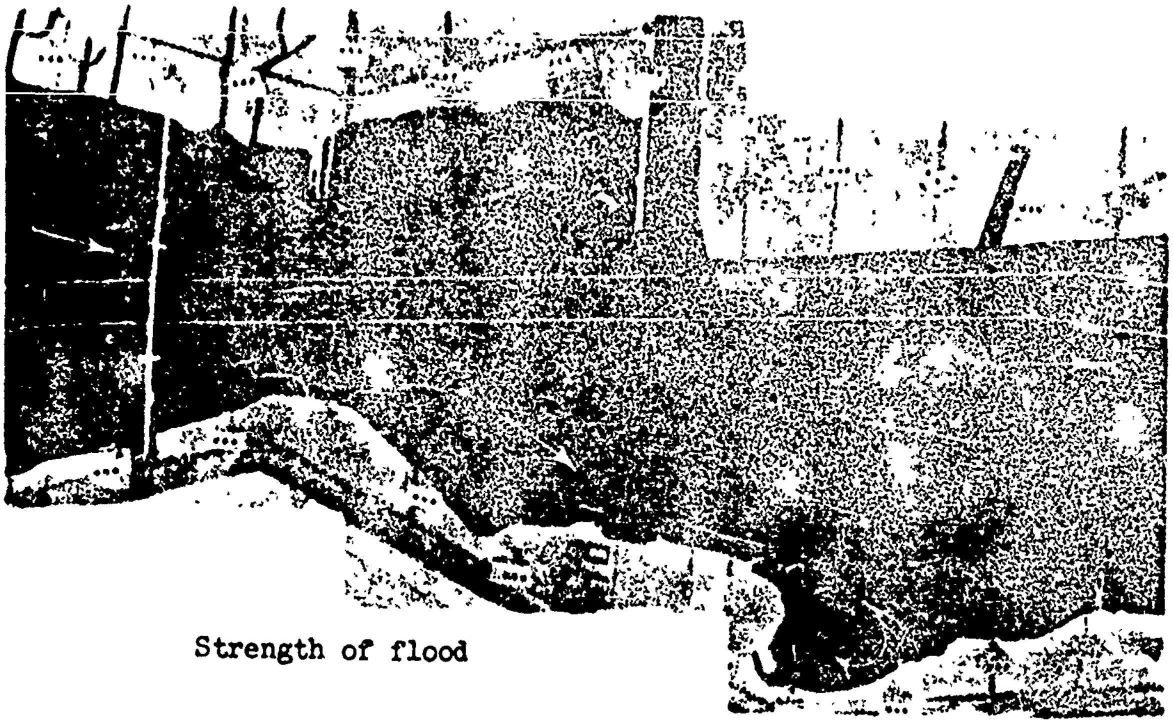
du Pont Effluent Dispersion Tests

Effluent Cycle Concentrations in ppm

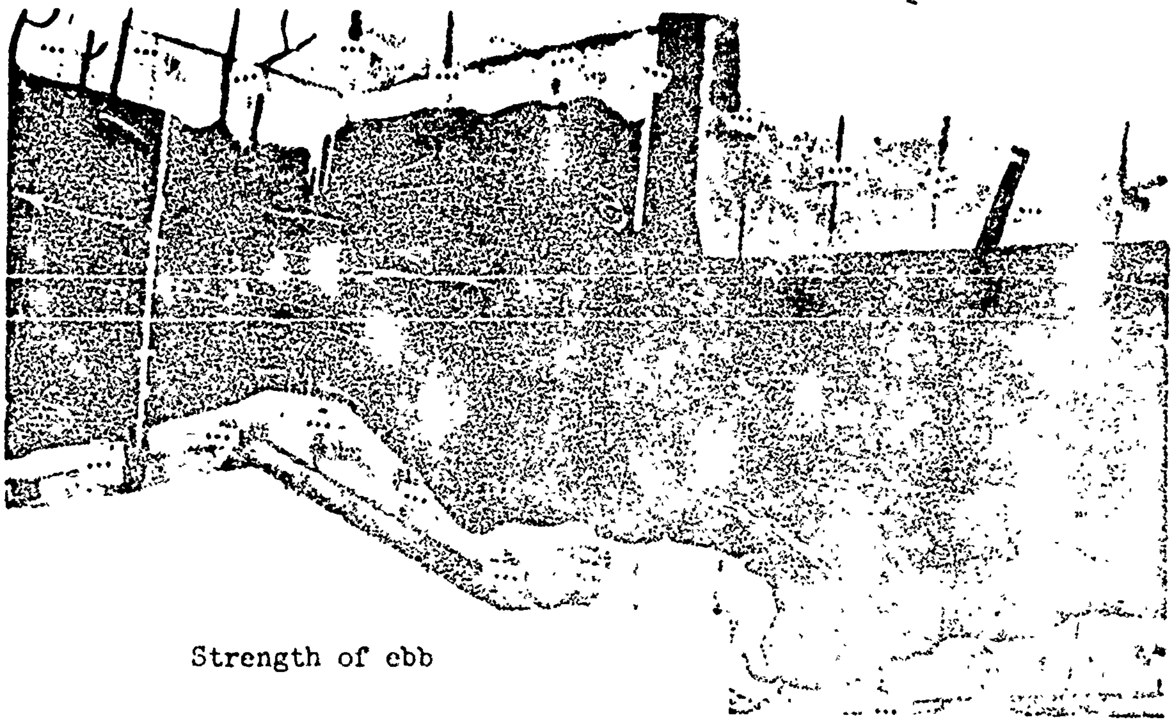
Tests 15, 16, and 18, Samples Taken during Cycle 17

Time in Hr	Test 15 Channel Stations				Test 16 Channel Stations				Test 18 Channel Stations					
	150	165	200	225	145	165	195	225	140	160	170	205	225	250
0.0	0.82	----	1.58	----	2.05	----	0.97	----	0.97	----	----	1.39	----	----
0.5	----	1.33	----	1.09	----	1.77	----	0.44	----	2.32	----	----	0.97	----
1.0	----	----	----	----	----	----	----	----	----	----	2.58	----	----	0.81
1.5	----	----	1.79	----	----	----	----	----	----	----	----	----	1.28	----
2.0	0.56	----	----	----	1.88	----	1.19	----	0.85	----	----	1.74	----	----
2.5	----	1.16	----	1.58	----	1.88	----	0.77	----	1.51	----	----	1.65	----
3.0	----	----	----	----	----	----	----	----	----	----	2.30	----	----	1.04
3.5	----	----	----	----	----	----	----	----	----	----	----	----	1.86	----
4.0	0.10	----	2.11	----	1.36	----	1.72	----	0.16	----	----	2.88	----	----
4.5	----	0.25	----	1.88	----	1.81	----	1.27	----	0.52	----	----	2.36	----
5.0	----	----	----	----	----	----	----	----	----	----	0.82	----	----	1.51
5.5	----	----	----	----	----	----	----	----	----	----	----	----	2.76	----
6.0	0.05	----	1.93	----	0.68	----	2.05	----	0.03	----	----	3.67	----	----
6.5	----	0.05	----	2.20	----	1.10	----	1.75	----	0.10	----	----	2.83	----
7.0	----	----	----	----	----	----	----	----	----	----	0.15	----	----	1.29
7.5	----	----	----	----	----	----	----	----	----	----	----	----	2.63	----
8.0	0.01	----	1.66	----	0.47	----	2.16	----	0.03	----	----	2.99	----	----
8.5	----	0.05	----	1.77	----	1.13	----	0.84	----	0.09	----	----	1.78	----
9.0	----	----	----	----	----	----	----	----	----	----	0.92	----	----	1.1[illegible]
9.5	----	----	----	----	----	----	----	----	----	----	----	----	1.49	-
10.0	0.05	----	2.03	----	0.85	----	1.78	----	0.07	----	----	1.86	----	----
10.5	----	0.73	----	1.16	----	1.89	----	0.59	----	1.57	----	----	1.20	----
11.0	----	----	----	----	----	----	----	----	----	----	2.81	----	----	0.77
11.5	----	----	----	----	----	----	----	----	----	----	----	----	1.06	----
12.0	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Note: Times are expressed in hours after moon's transit of 75th meridian.



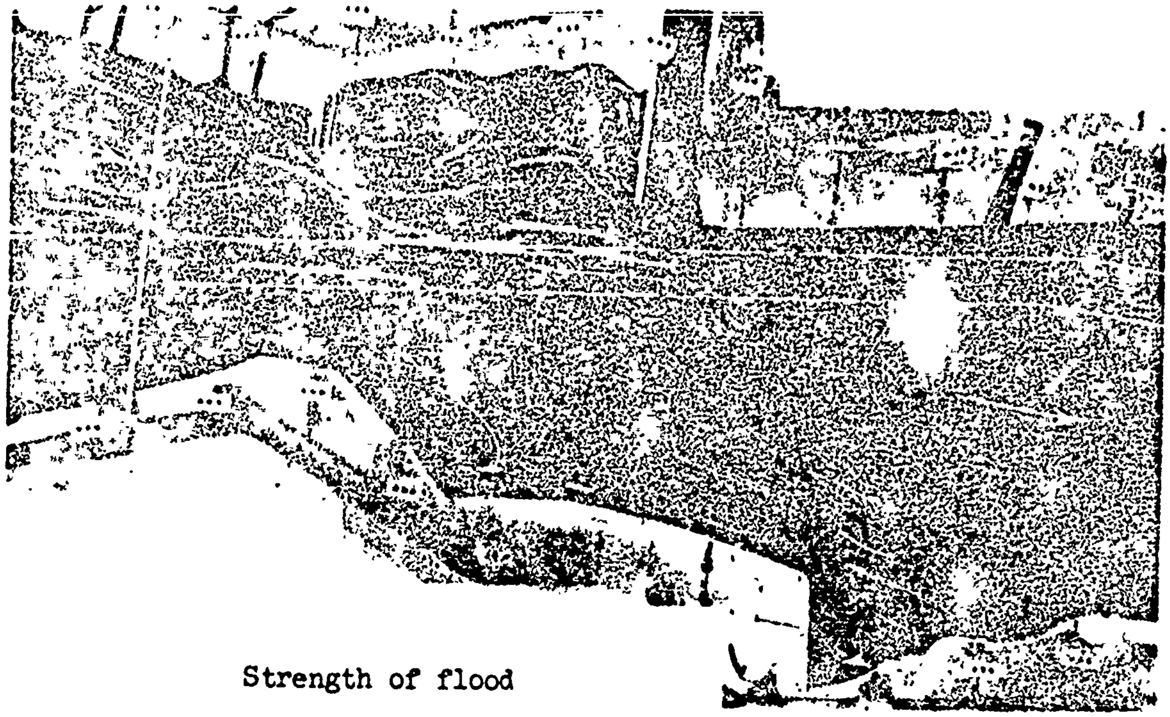
Strength of flood



Strength of ebb

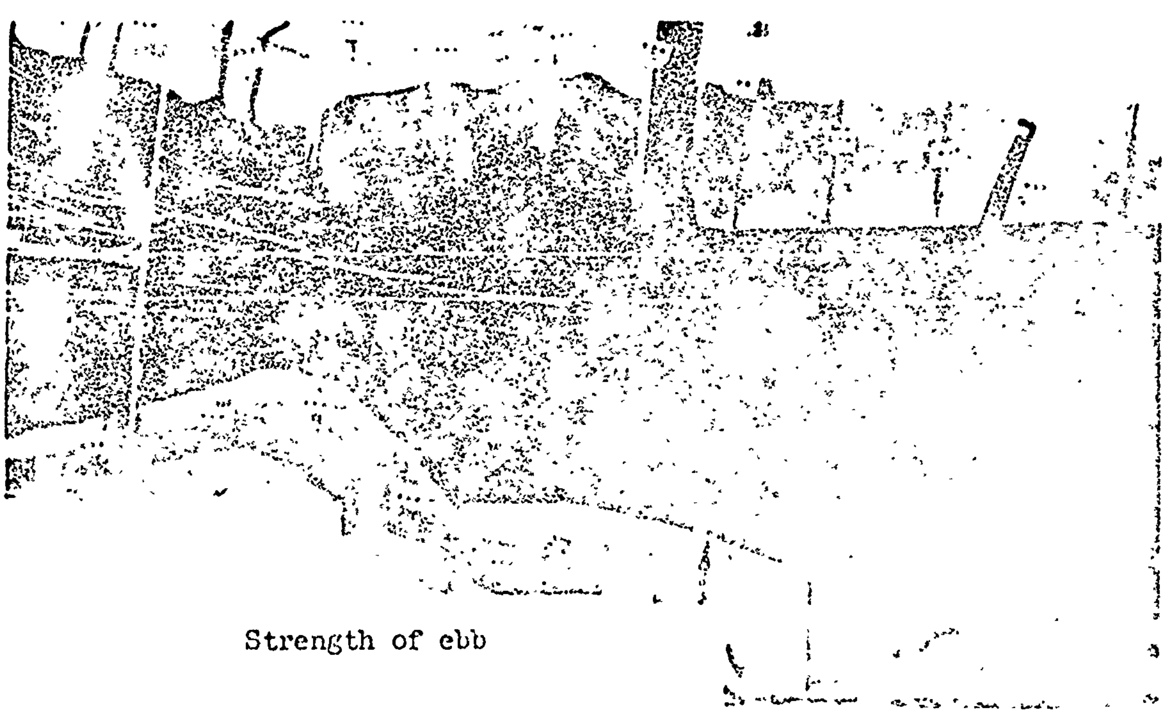
du Pont Effluent Dispersion Tests, surface current directions at strength of flood and ebb tides, existing shore line (base test), anchorage not dredged

PHOTOGRAPH 1



Strength of flood

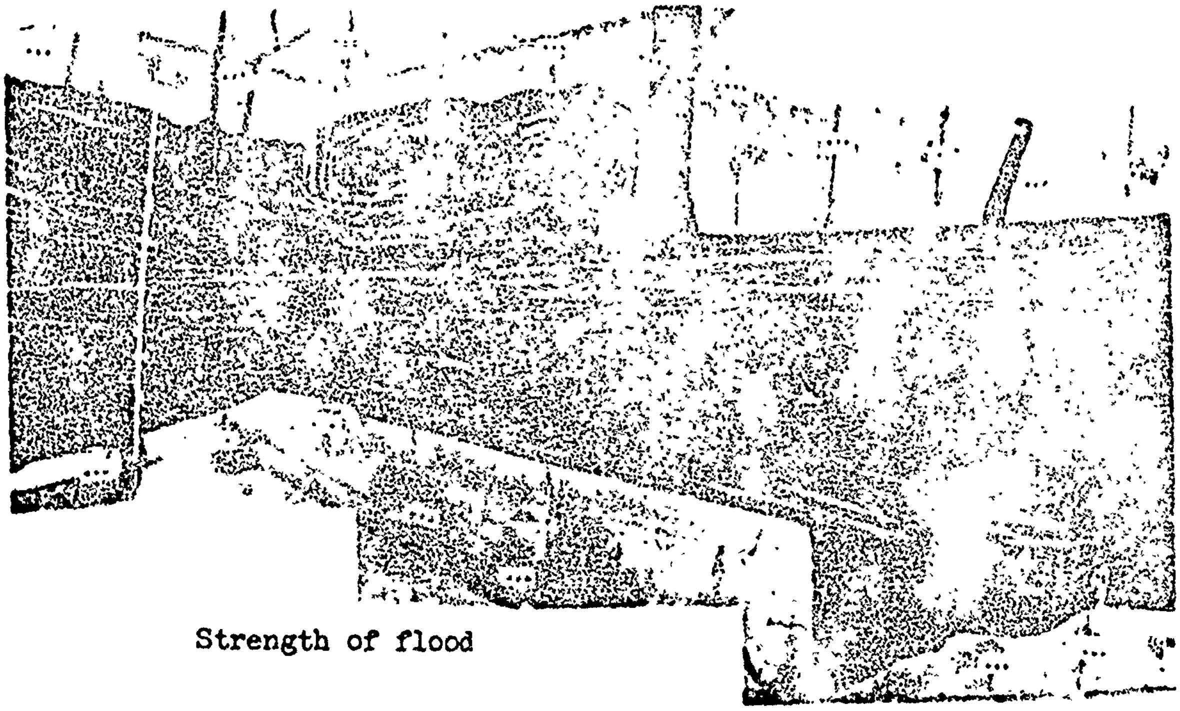
NOT REPRODUCIBLE



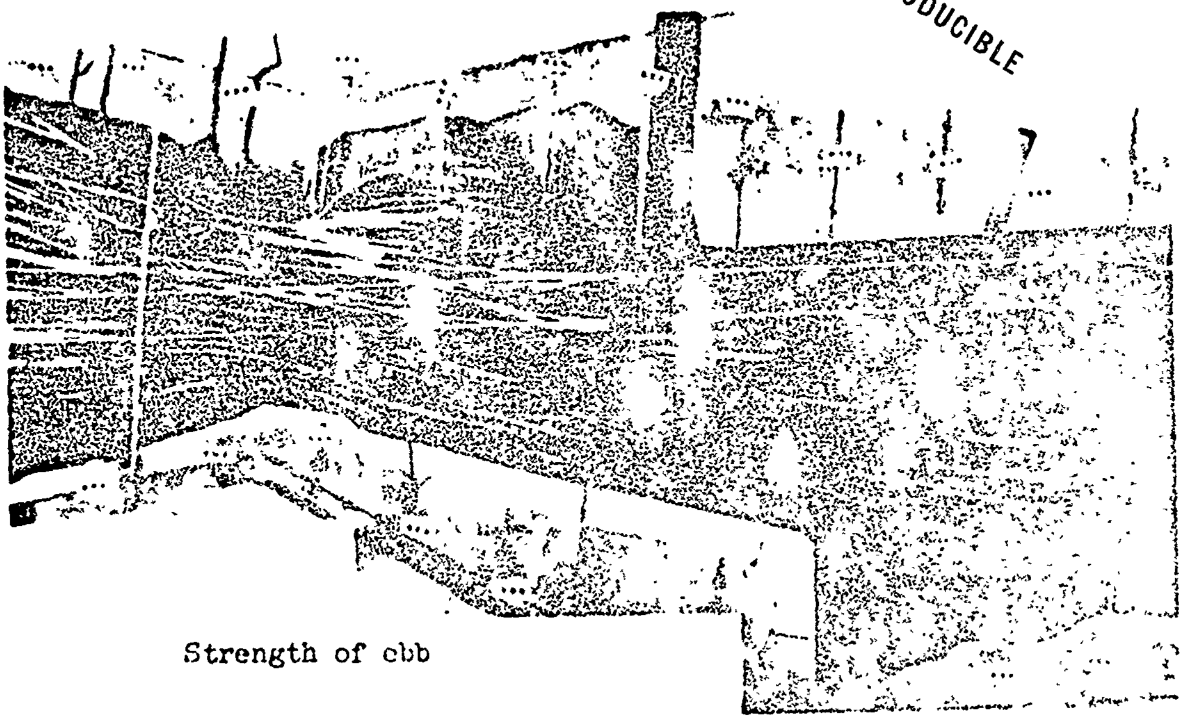
Strength of ebb

du Pont Effluent Dispersion Tests, surface current directions at strength of flood and ebb tide. [illegible] shore line, anchorage not dredged

PHOTOGRAPH [illegible]

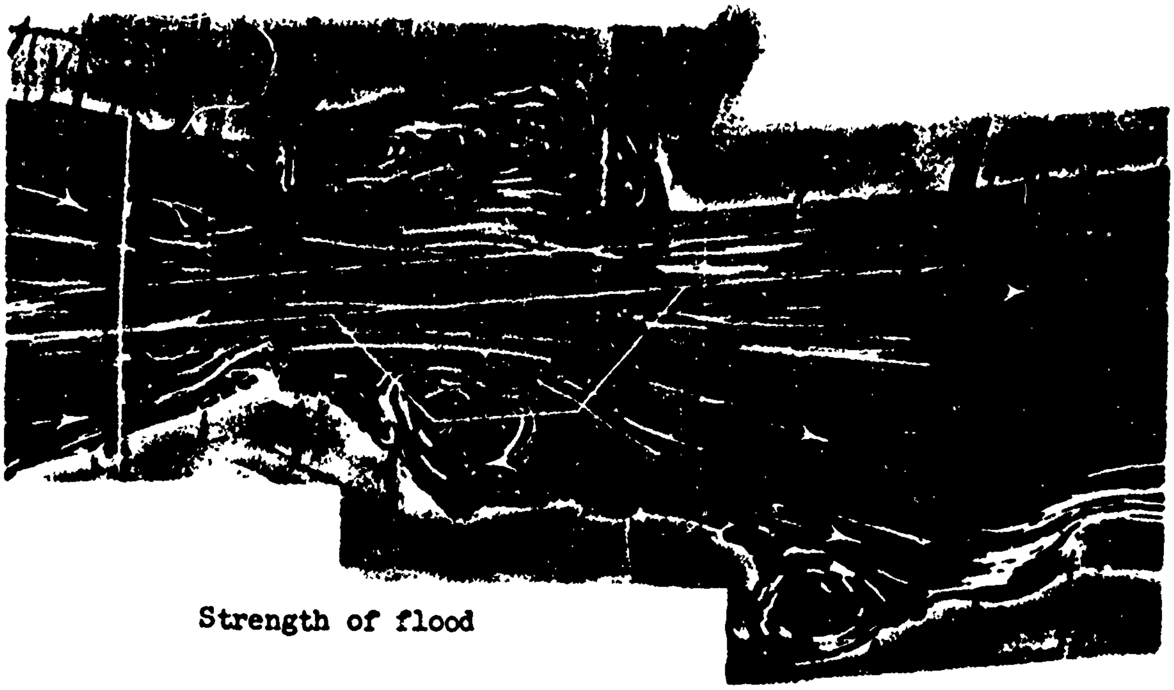


Strength of flood

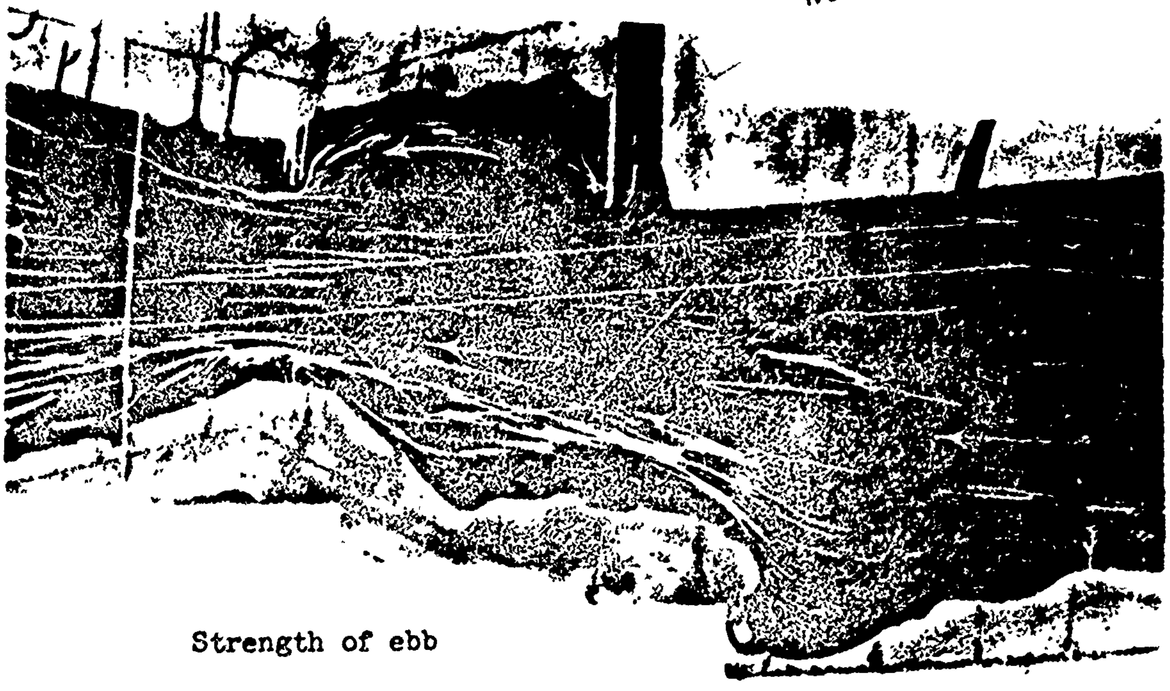


Strength of ebb

du Pont Effluent Dispersion Tests, surface current directions at strength of flood and ebb tides, Plan 2 shore line, anchorage not dredged



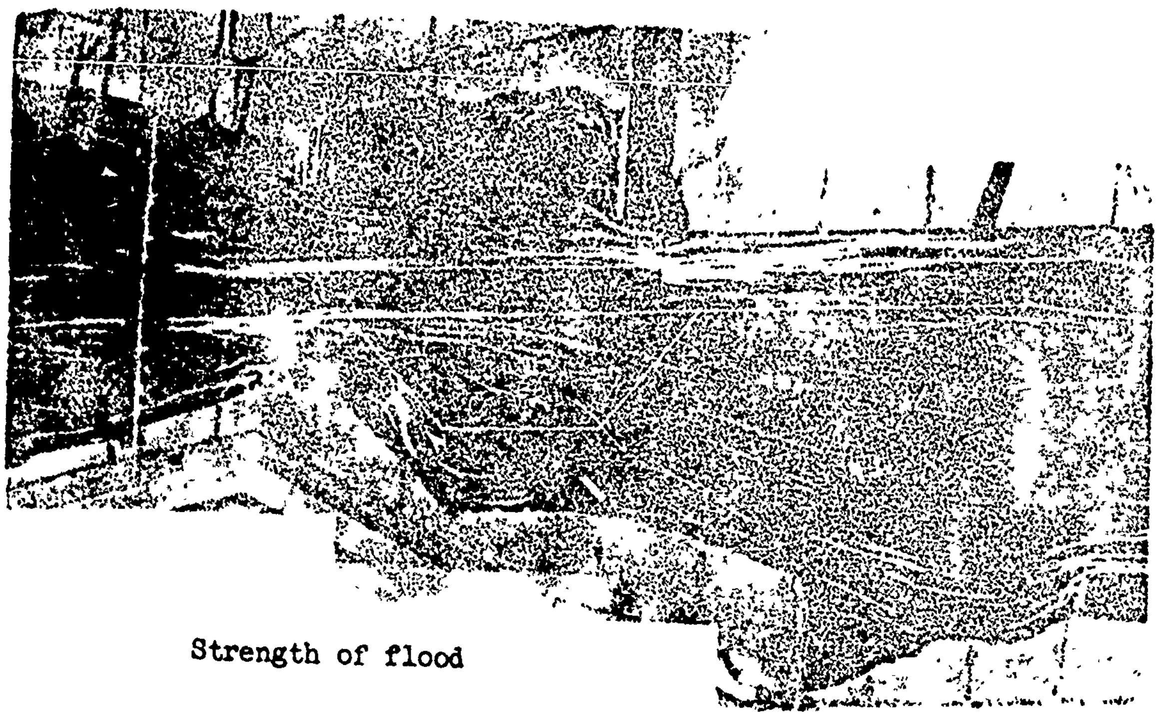
Strength of flood



Strength of ebb

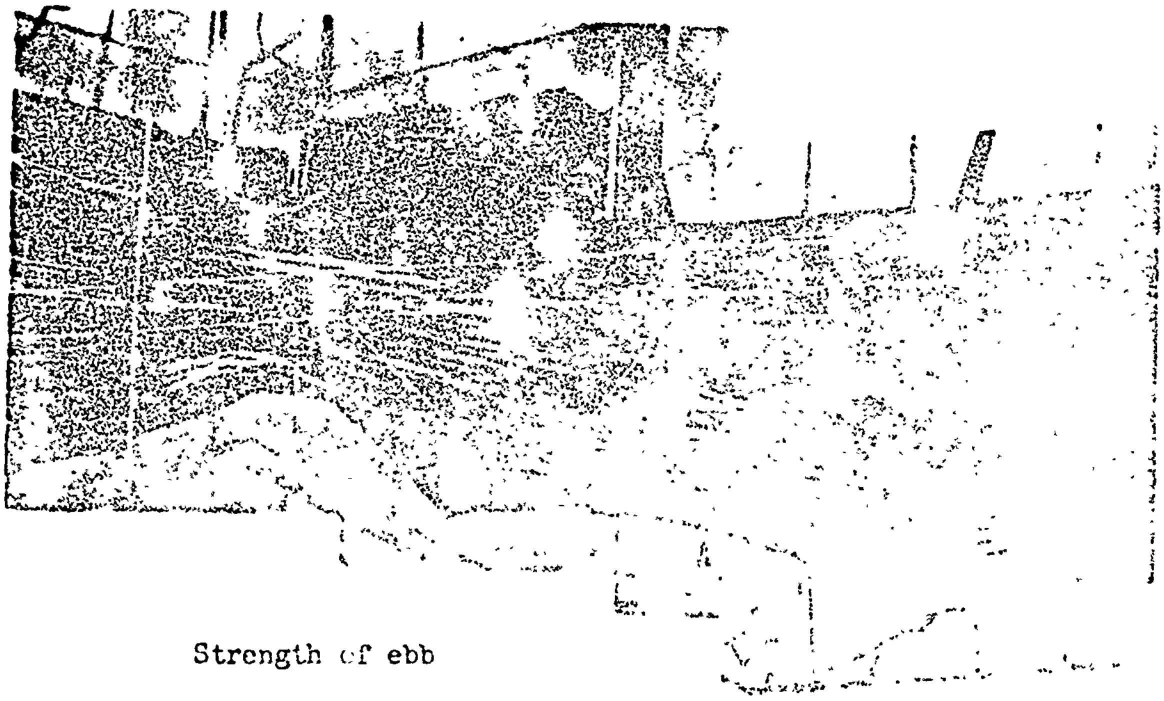
du Pont Effluent Dispersion Tests, surface current directions at strength of flood and ebb tides, existing shore line (base test), anchorage dredged

PHOTOGRAPH 4



Strength of flood

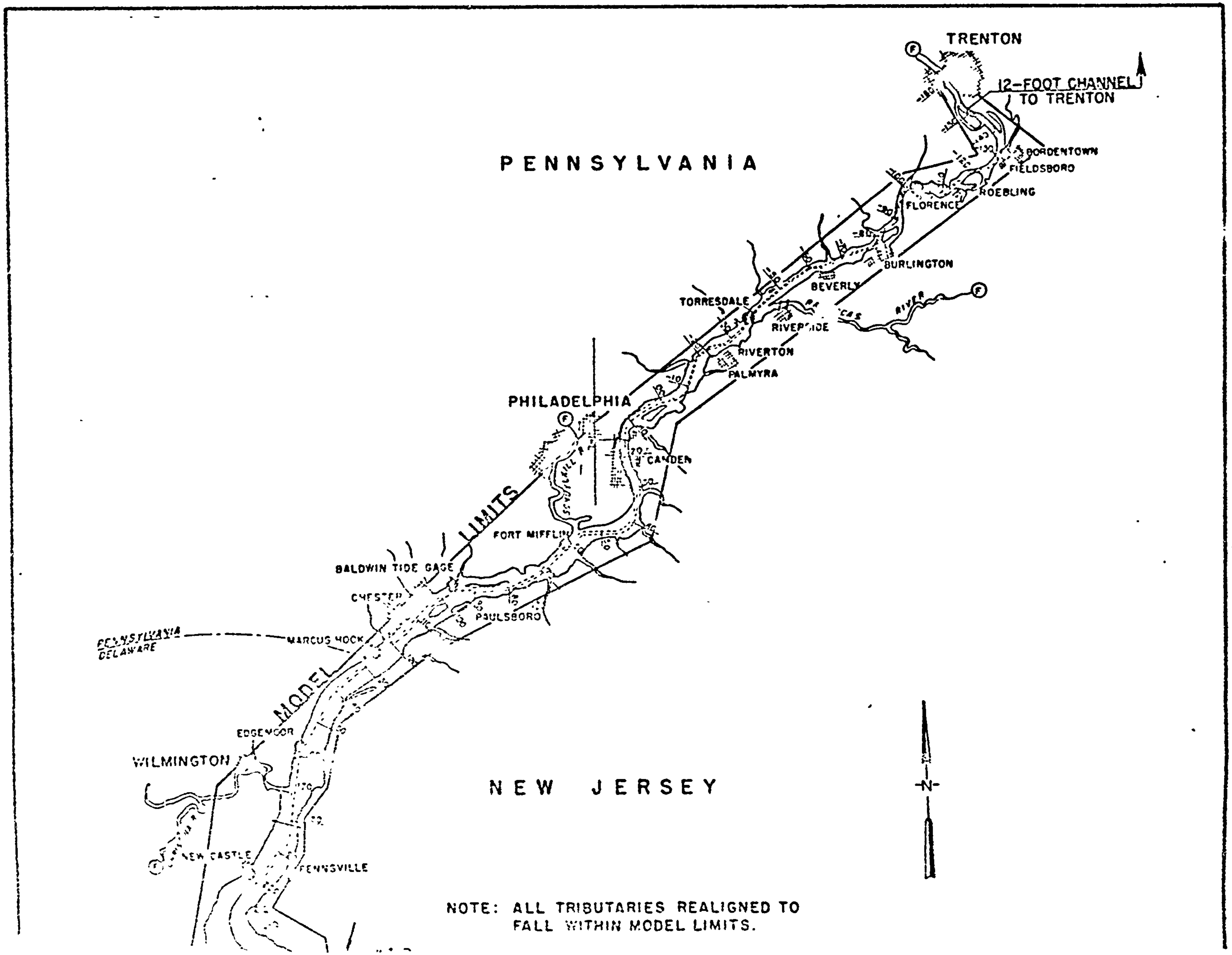
NOT REPRODUCIBLE

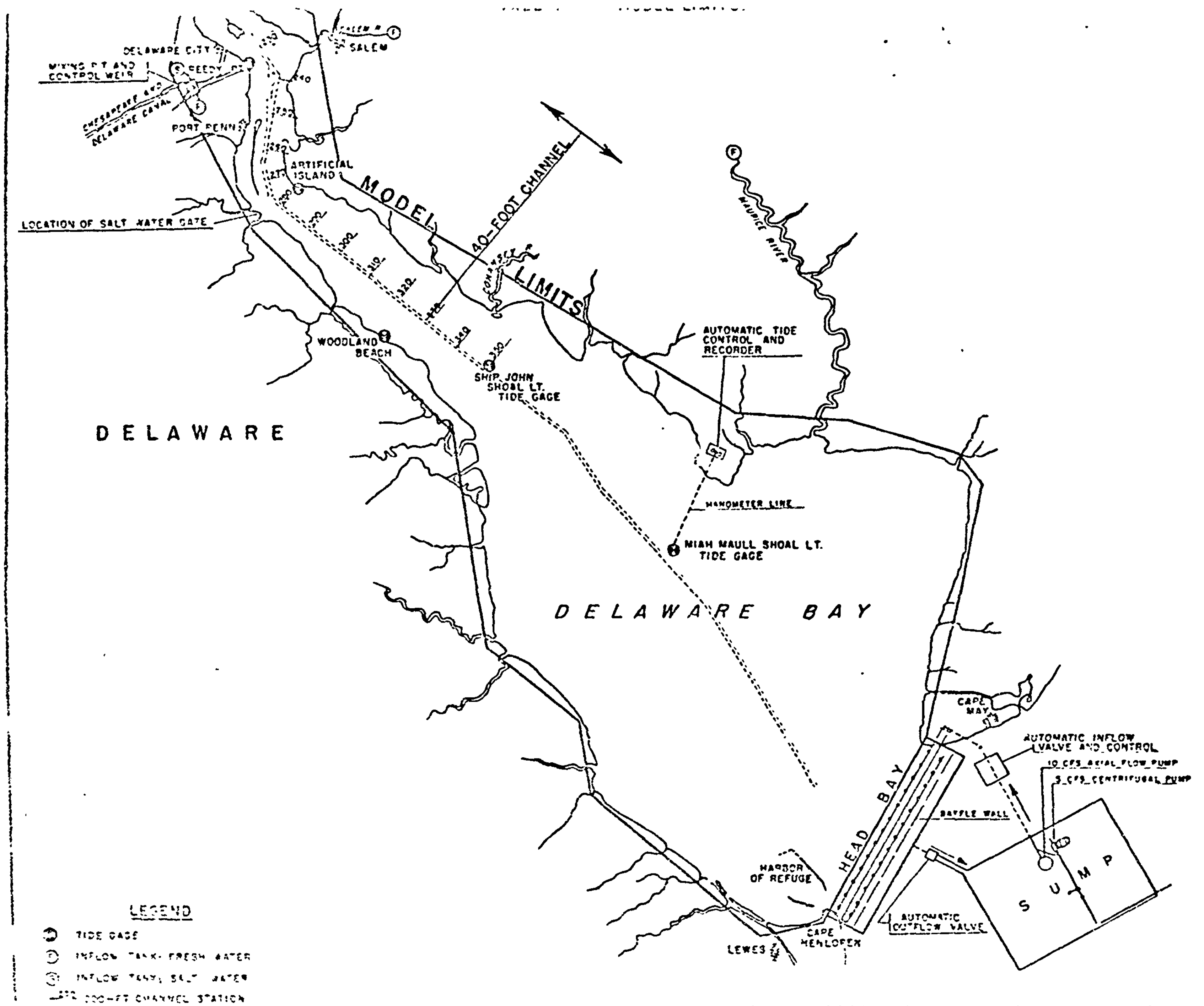


Strength of ebb

du Pont Effluent Dispersion Tests, surface current directions at strength of flood and ebb tides, Plan 1 shore line, anchorage dredged

PHOTOGRAPH 5


TRENTON
12-FOOT CHANNEL TO TRENTON
PENNSYLVANIA
BORDENTOWN
FIELDSBORO
ROEBLING
FLORENCE
BURLINGTON
BEVERLY
TORRESDALE
RIVERTON
PALMYRA
PHILADELPHIA
CAMDEN
LIMITS
FORT MIFFLIN
BALDWIN TIDE GAGE
PAULSBORO
PENNSYLVANIA
DELAWARE
MARCUS HOOK
MODEL
EDGEMOOR
WILMINGTON
NEW CASTLE
PENNSVILLE
NEW JERSEY
N
NOTE: ALL TRIBUTARIES REALIGNED TO FALL WITHIN MODEL LIMITS.



LOCATIONS OF CHANNEL STATIONS

SCALES IN FEET

PROTOTYPE

MODEL

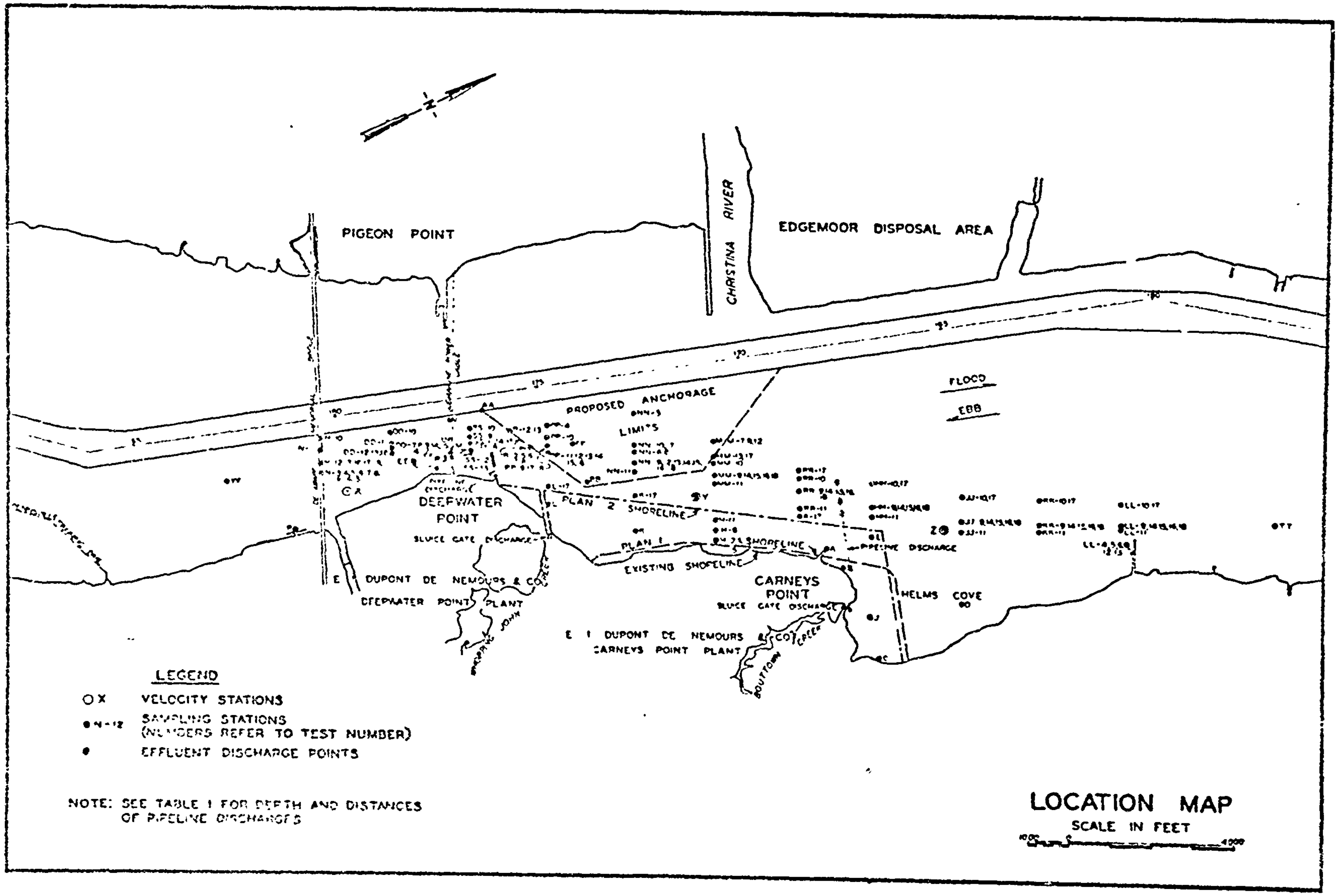
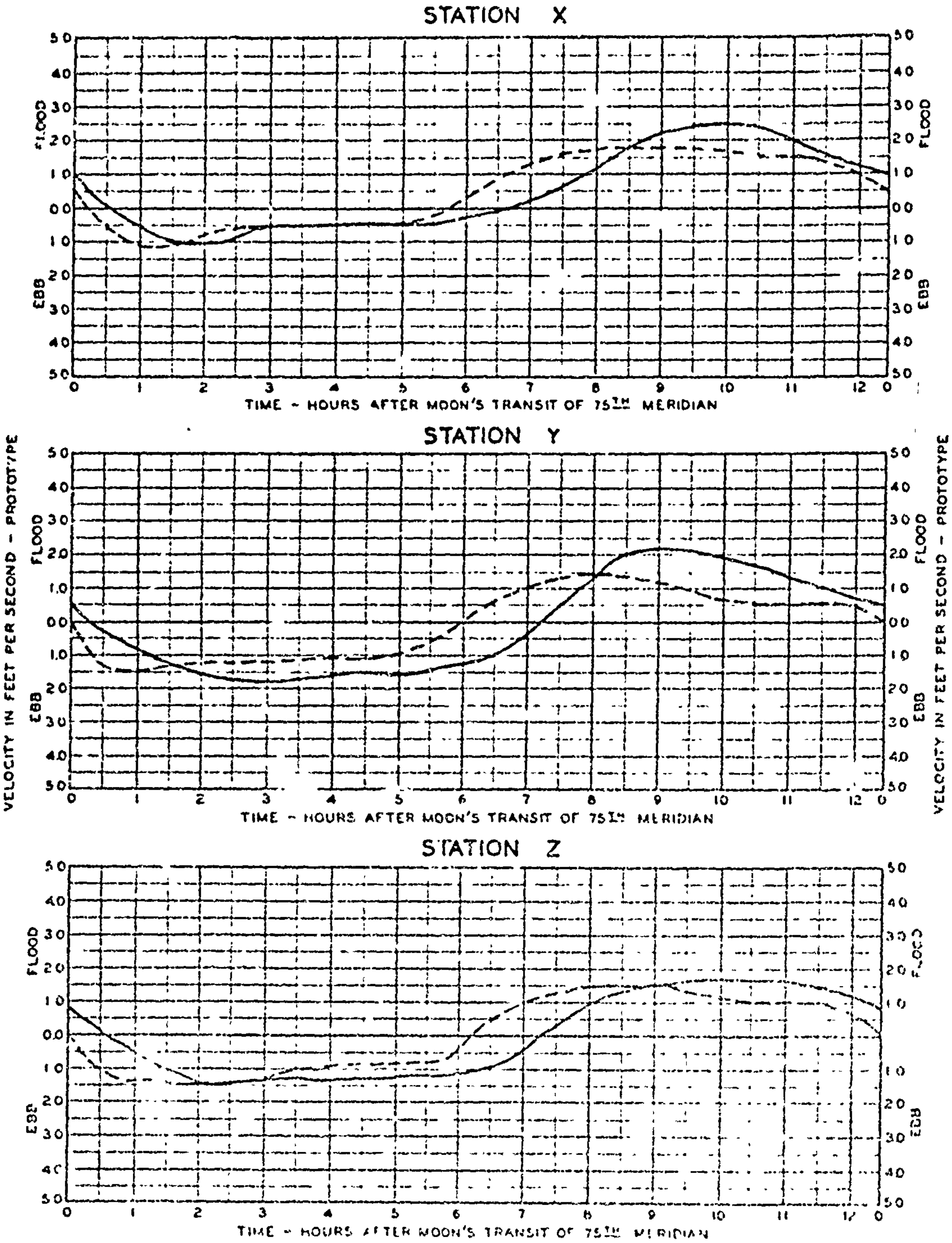

PIGEON POINT
CHRISTINA RIVER
EDGEMOOR DISPOSAL AREA
PROPOSED ANCHORAGE
LIMITS
FLOOD
EBB
DEEPWATER POINT
SLUICE GATE DISCHARGE
PLAN 2 SHORELINE
PLAN 1
SHORELINE
EXISTING SHORELINE
PIPELINE DISCHARGE
CARNEYS POINT
HELMS COVE
E I DUPONT DE NEMOURS & CO
DEEPWATER POINT PLANT
E I DUPONT DE NEMOURS & CO
CARNEYS POINT PLANT
LEGEND
VELOCITY STATIONS
SAMPLING STATIONS
(NUMBERS REFER TO TEST NUMBER)
EFFLUENT DISCHARGE POINTS
NOTE: SEE TABLE I FOR DEPTH AND DISTANCES
OF PIPELINE DISCHARGES
LOCATION MAP
SCALE IN FEET

PLATE 2



MODEL TEST DATA

TIDE	MEAN
FRESH WATER DISCHARGE	10475 CFS
OCEAN SALINITY	28000 PPM

LEGEND

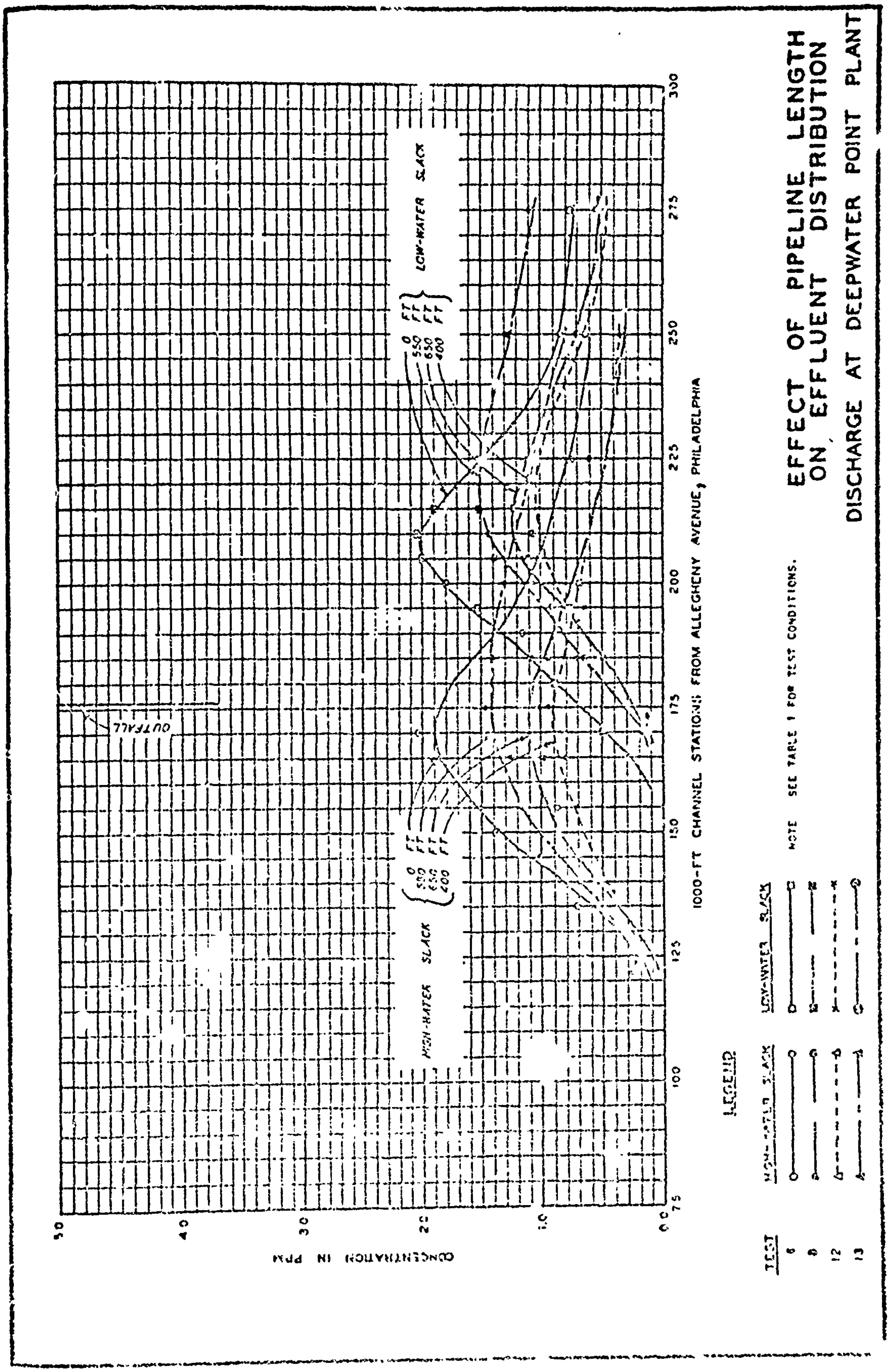
——— MODEL
------- PROTOTYPE

NOTE: SEE PLATE 2 FOR LOCATIONS OF VELOCITY STATIONS

VELOCITY OBSERVATIONS

STATIONS X, Y, Z

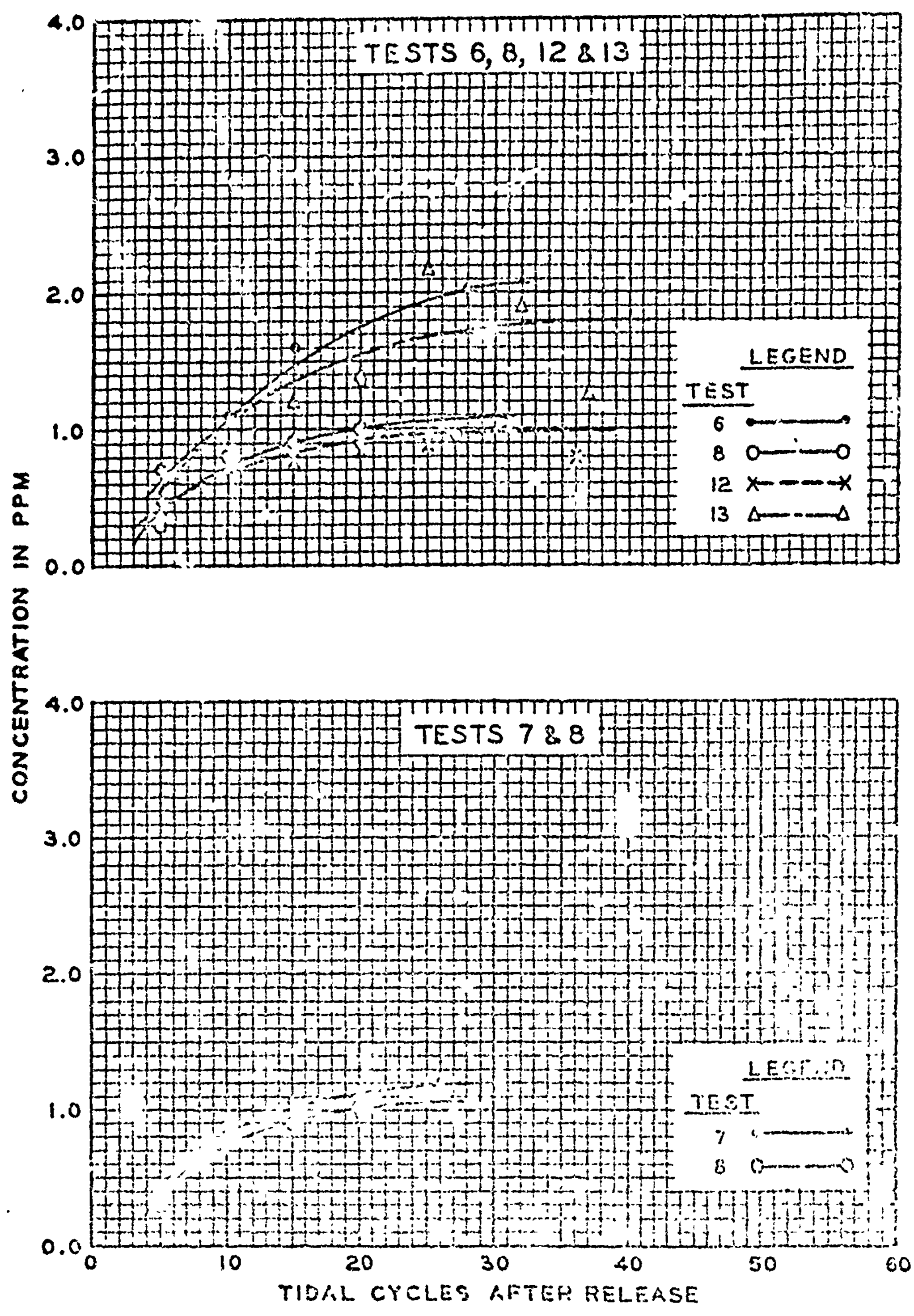
PLATE 3



EFFECT OF PIPELINE LENGTH ON EFFLUENT DISTRIBUTION

DISCHARGE AT DEEPWATER POINT PLANT

PLATE 4



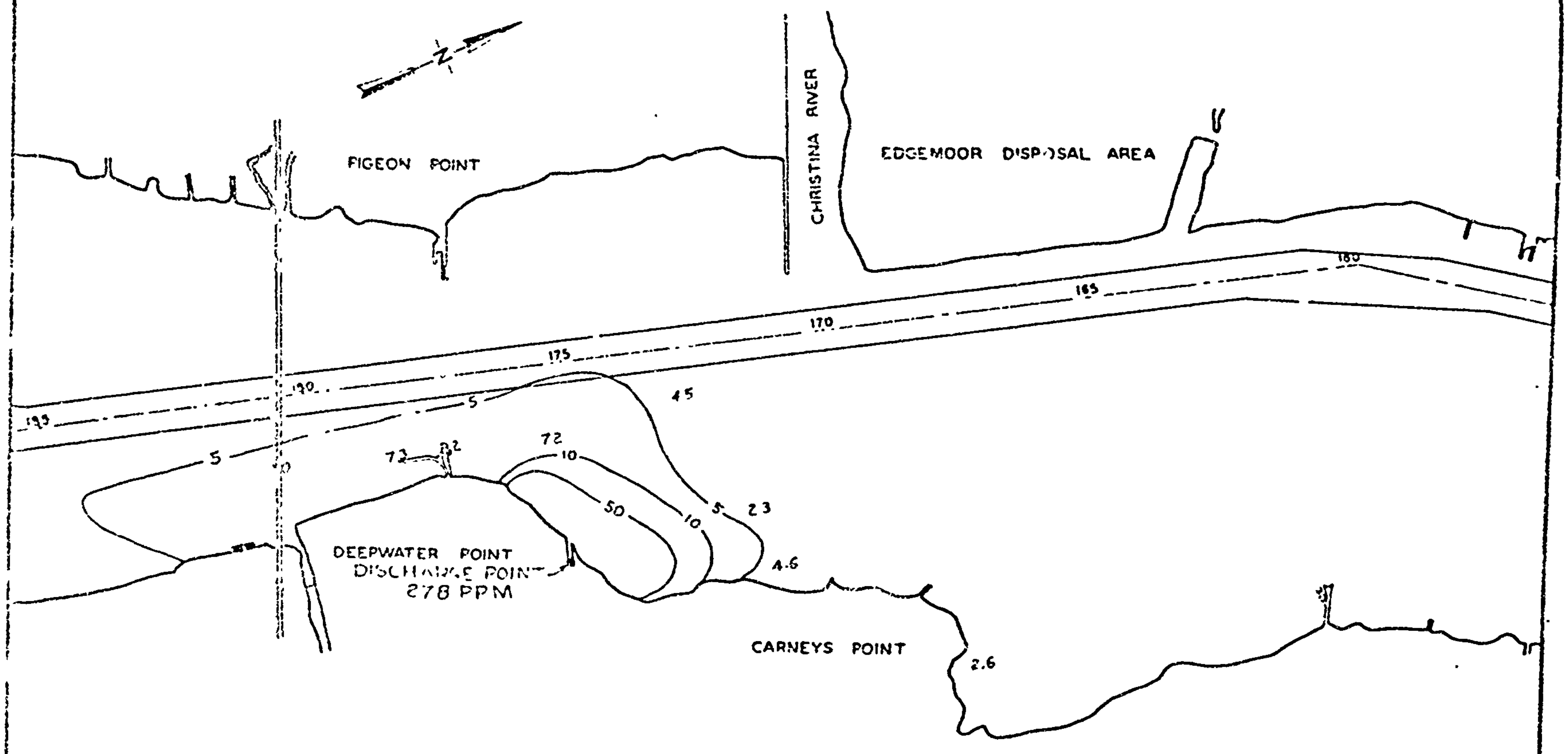
NOTE: SEE TABLE I FOR TEST CONDITIONS.

SAMPLES TAKEN AT HIGH-WATER SLACK.

EFFLUENT CONCENTRATION AT STATION 170+000

DEEPWATER POINT PLANT DISCHARGE

PLATE 5



NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION

TEST 3

SCALE IN FEET

1000 0 2000 6000

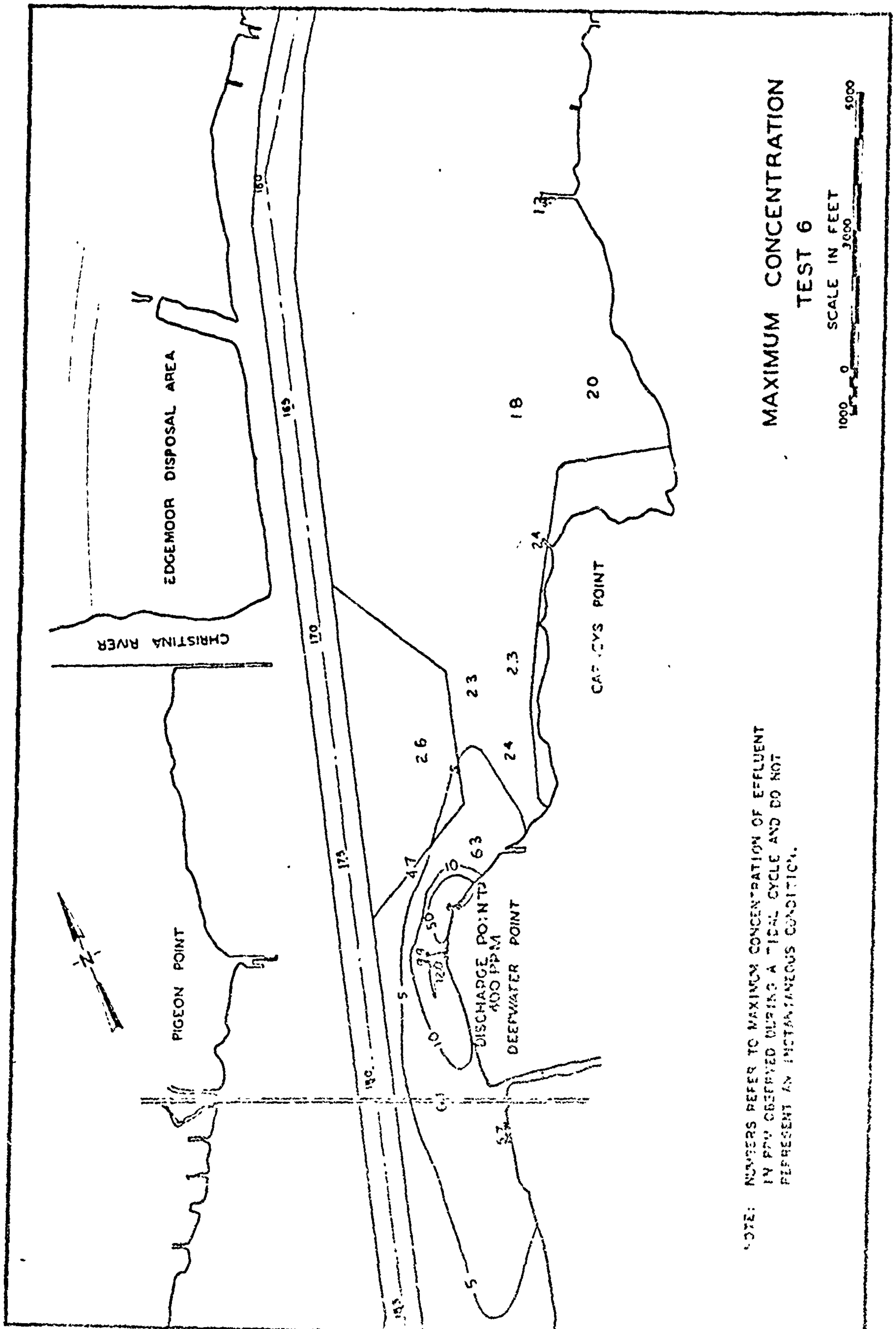
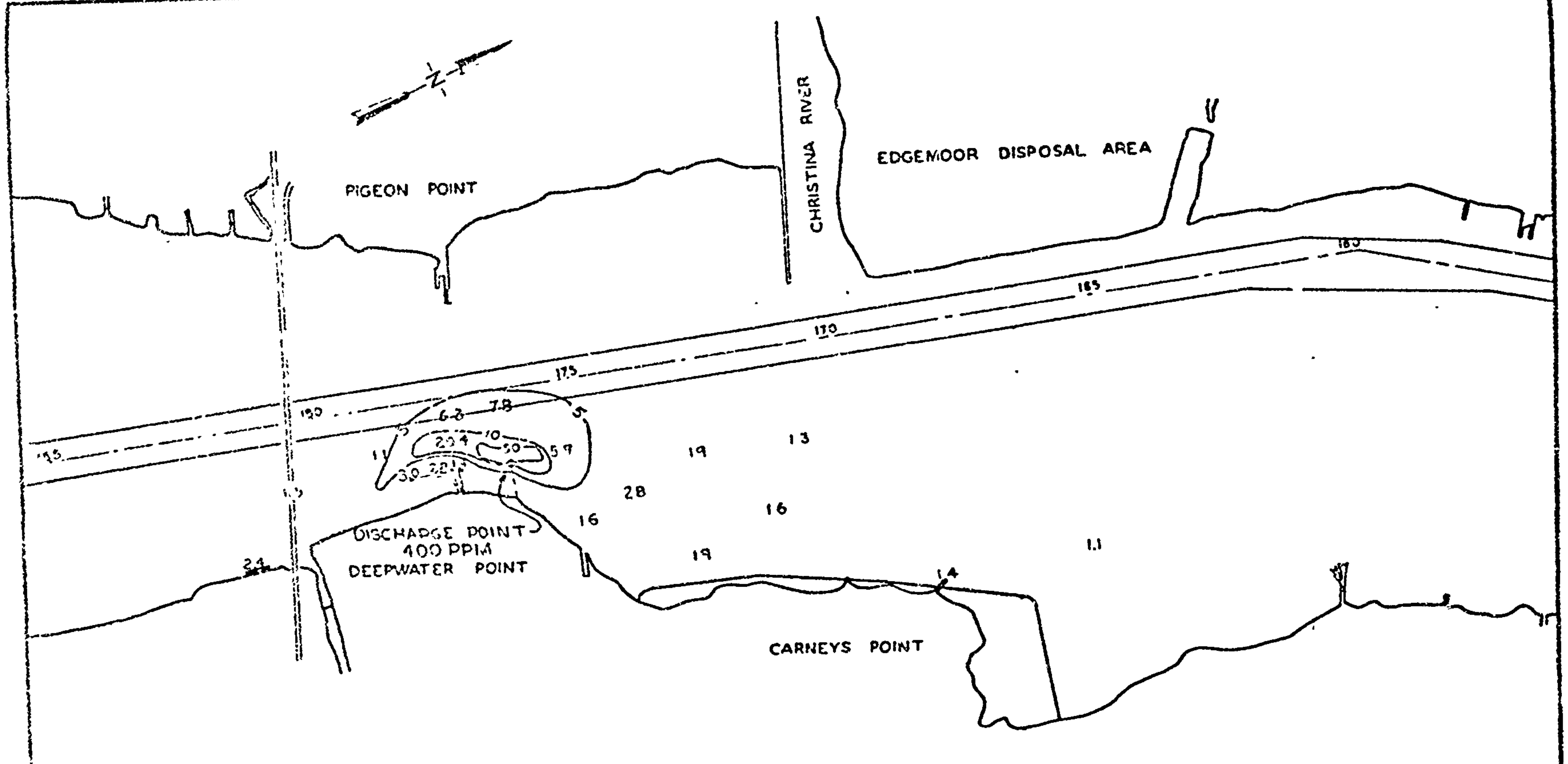

MAXIMUM CONCENTRATION
TEST 6
SCALE IN FEET
1000 0 3000 5000
EDGEMOOR DISPOSAL AREA
CHRISTINA RIVER
PIGEON POINT
CARNEYS POINT
DISCHARGE POINT
400 PPM
DEEPWATER POINT
NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

PLATE 7

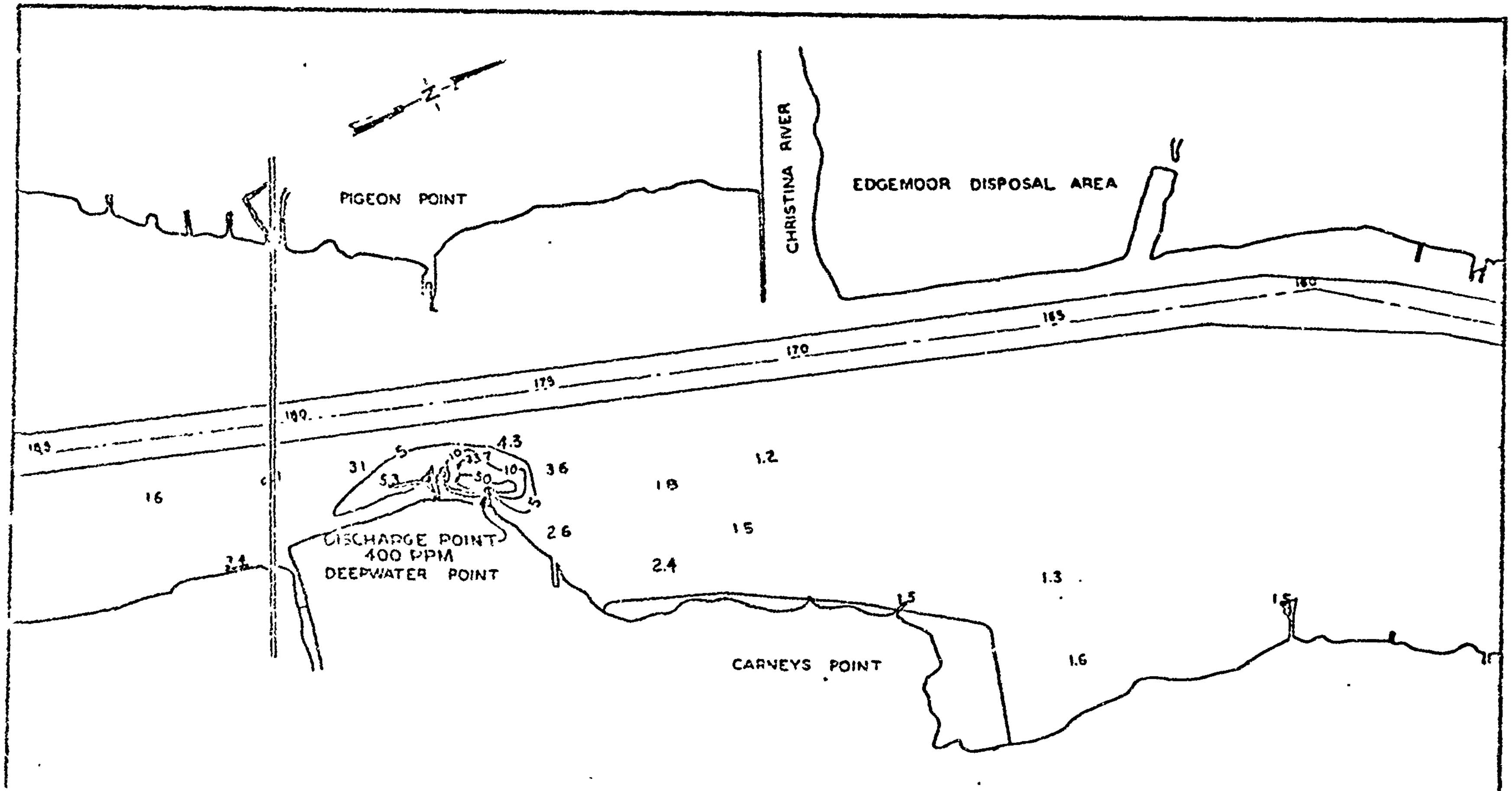


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 8

SCALE IN FEET

1000 0 3000 6000

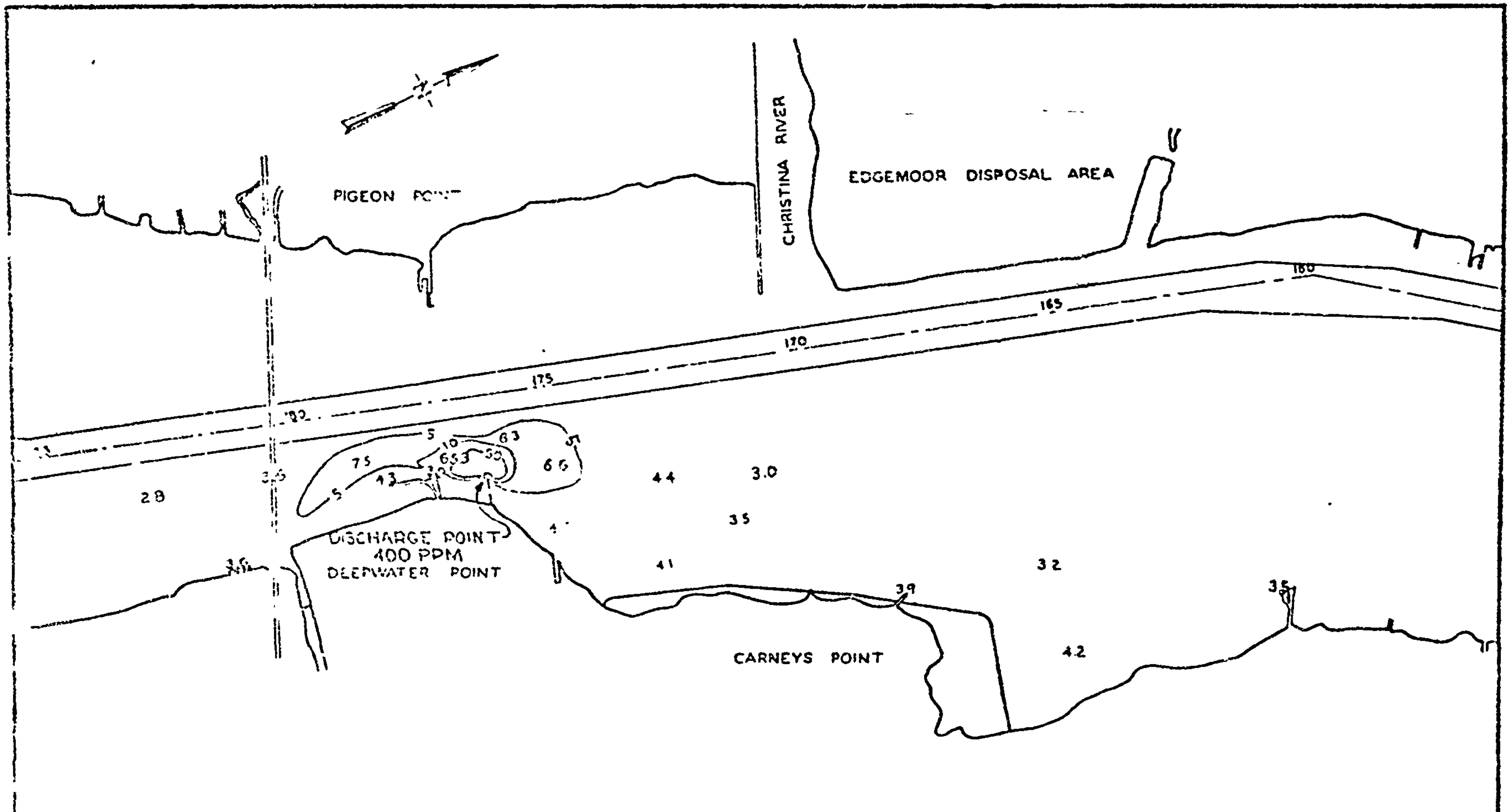


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 12

SCALE IN FEET
1000 0 3000 6000

PLATE 9

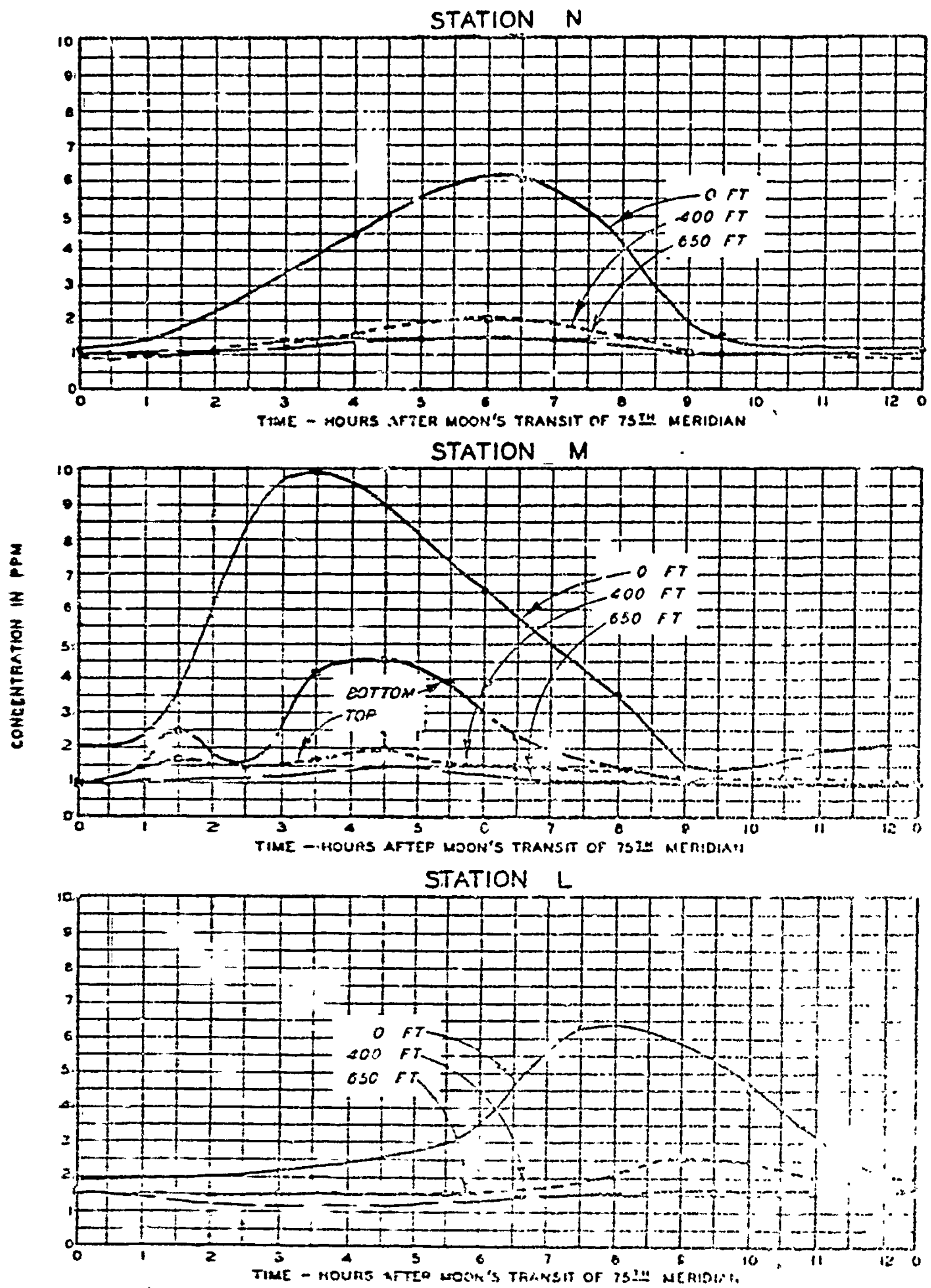


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 13

SCALE IN FEET
1000 0 3000 6000

PLATE 13



LEGEND

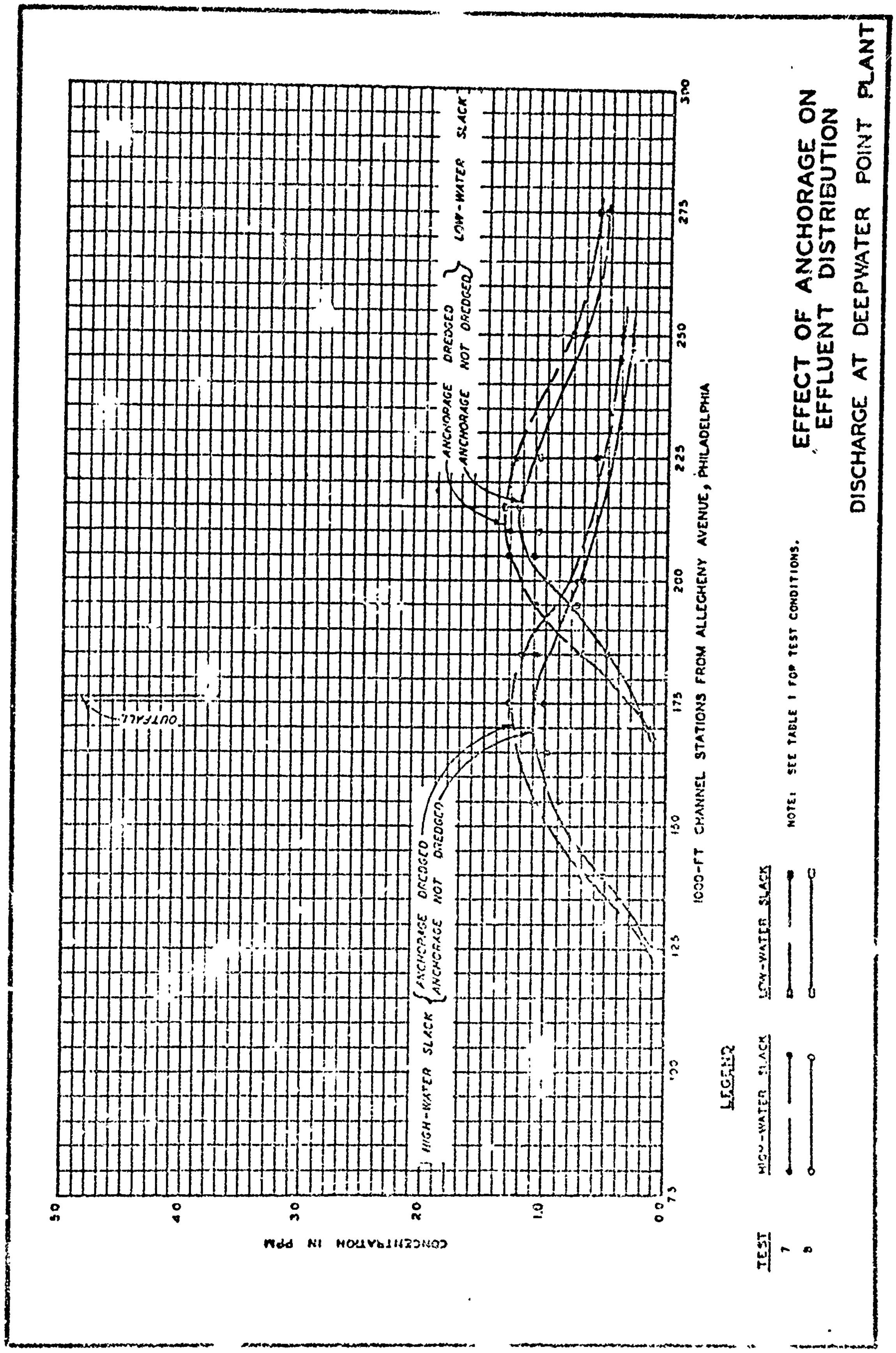
TEST

6
8
12

EFFECT OF PIPELINE LENGTH
ON LOCAL CONCENTRATION
THROUGHOUT A TIDAL CYCLE

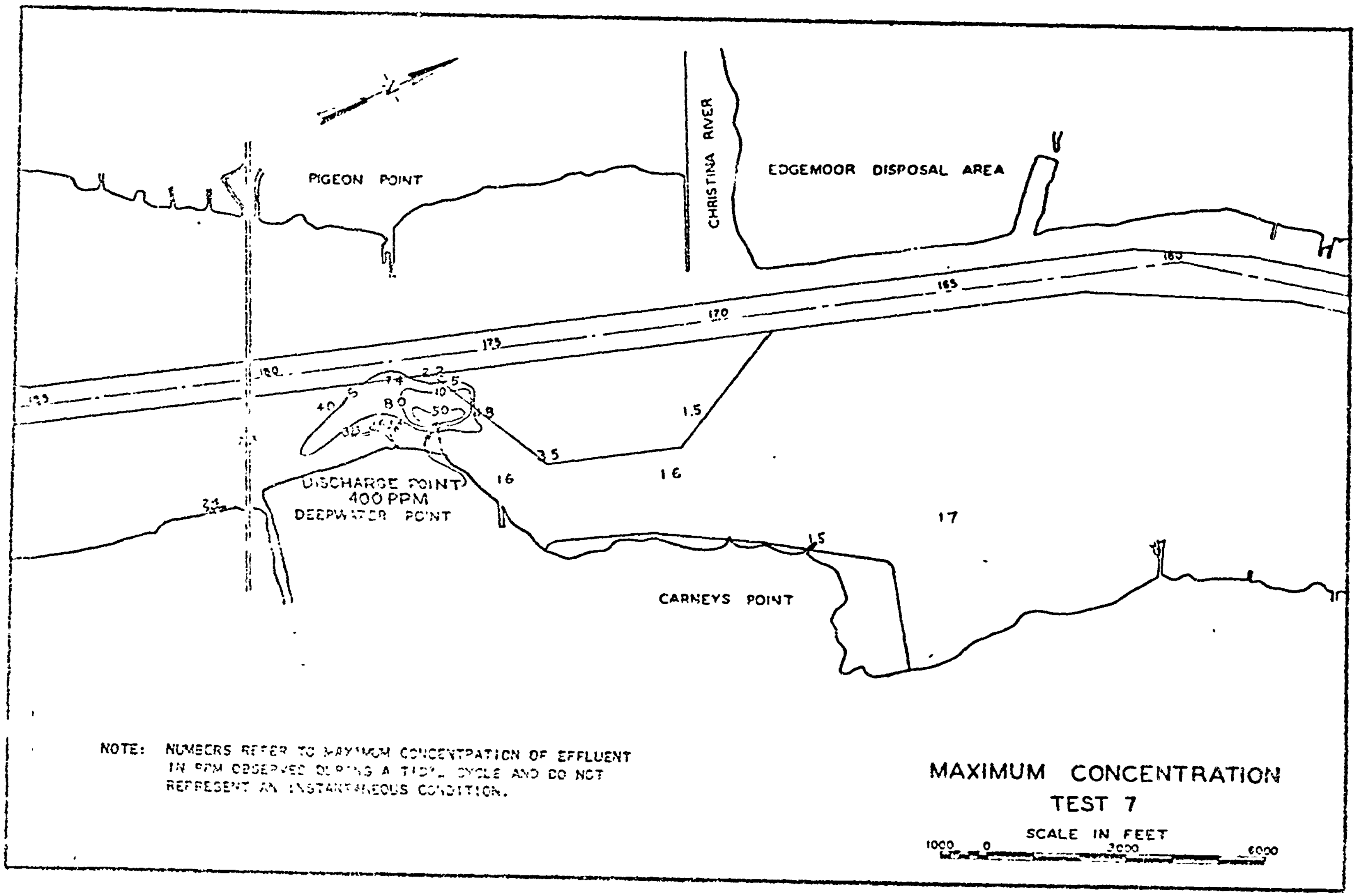
DISCHARGE AT
DEEPWATER POINT PLANT

PLATE 11



EFFECT OF ANCHORAGE ON EFFLUENT DISTRIBUTION
DISCHARGE AT DEEPWATER POINT PLANT

PLATE 12

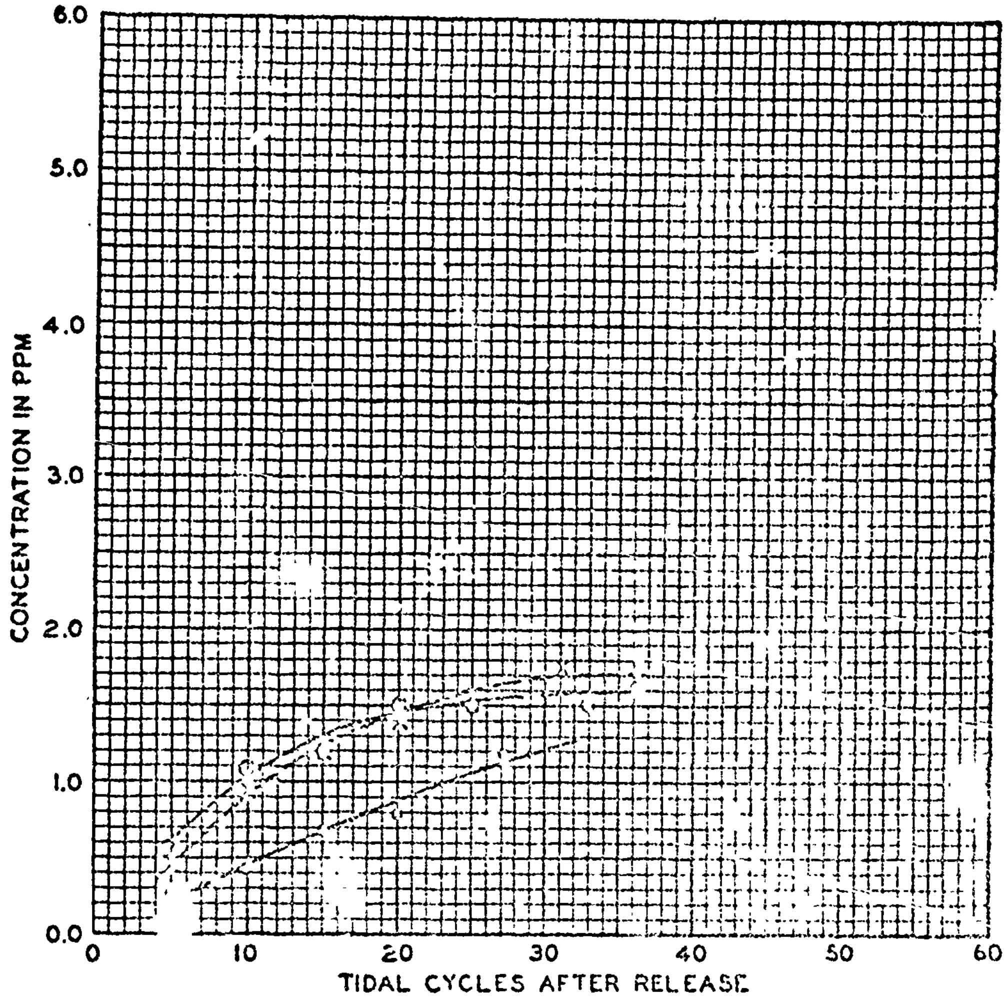


MAXIMUM CONCENTRATION
TEST 7

SCALE IN FEET
1000 0 3000 6000

NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

PLATE 13



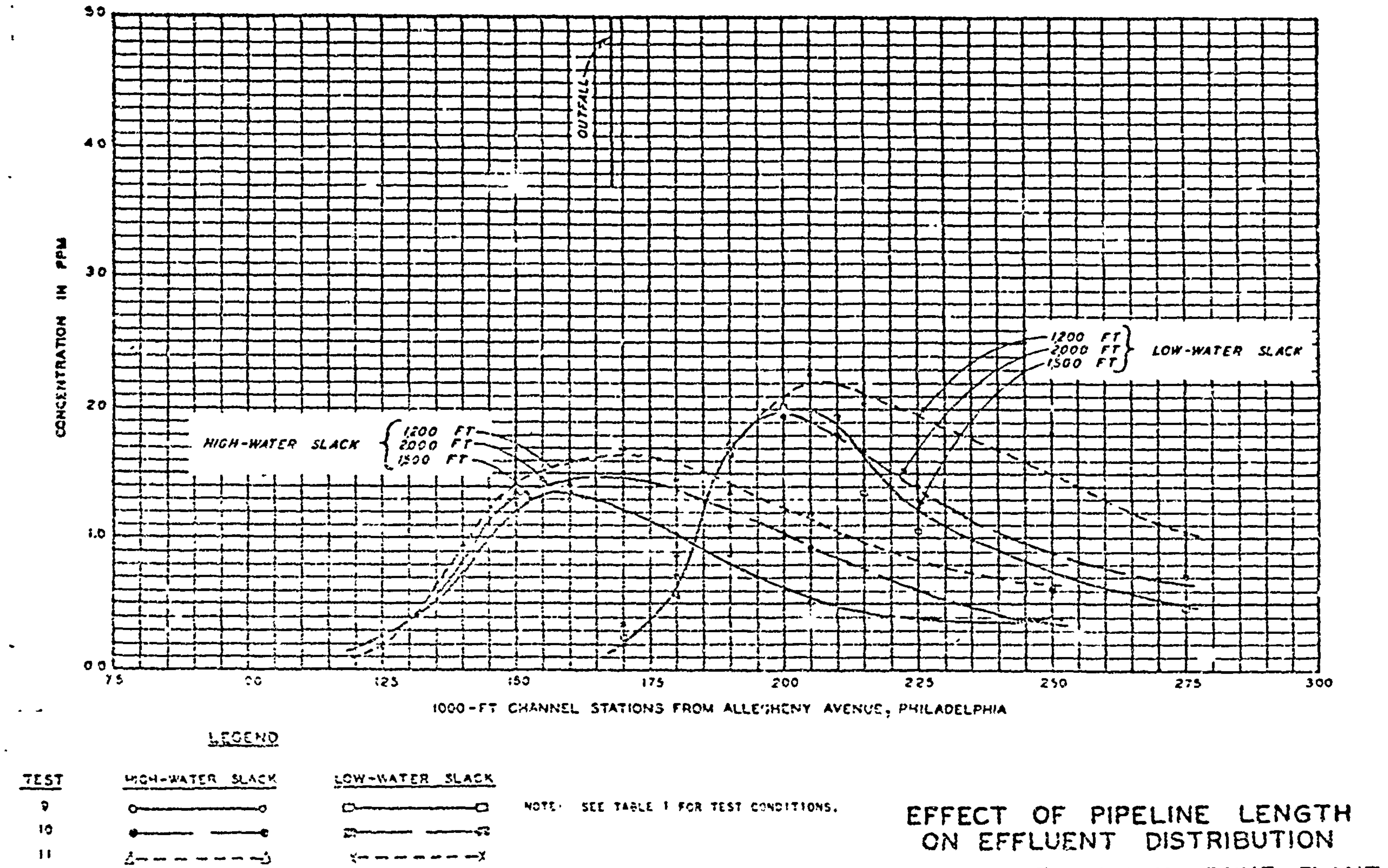
LEGEND

TEST	
9	•———•
10	o—— ——o
11	x— — — —x

NOTE: SEE TABLE I FOR TEST CONDITIONS

SAMPLES TAK[illegible]T HIGH-WATER [illegible]CK

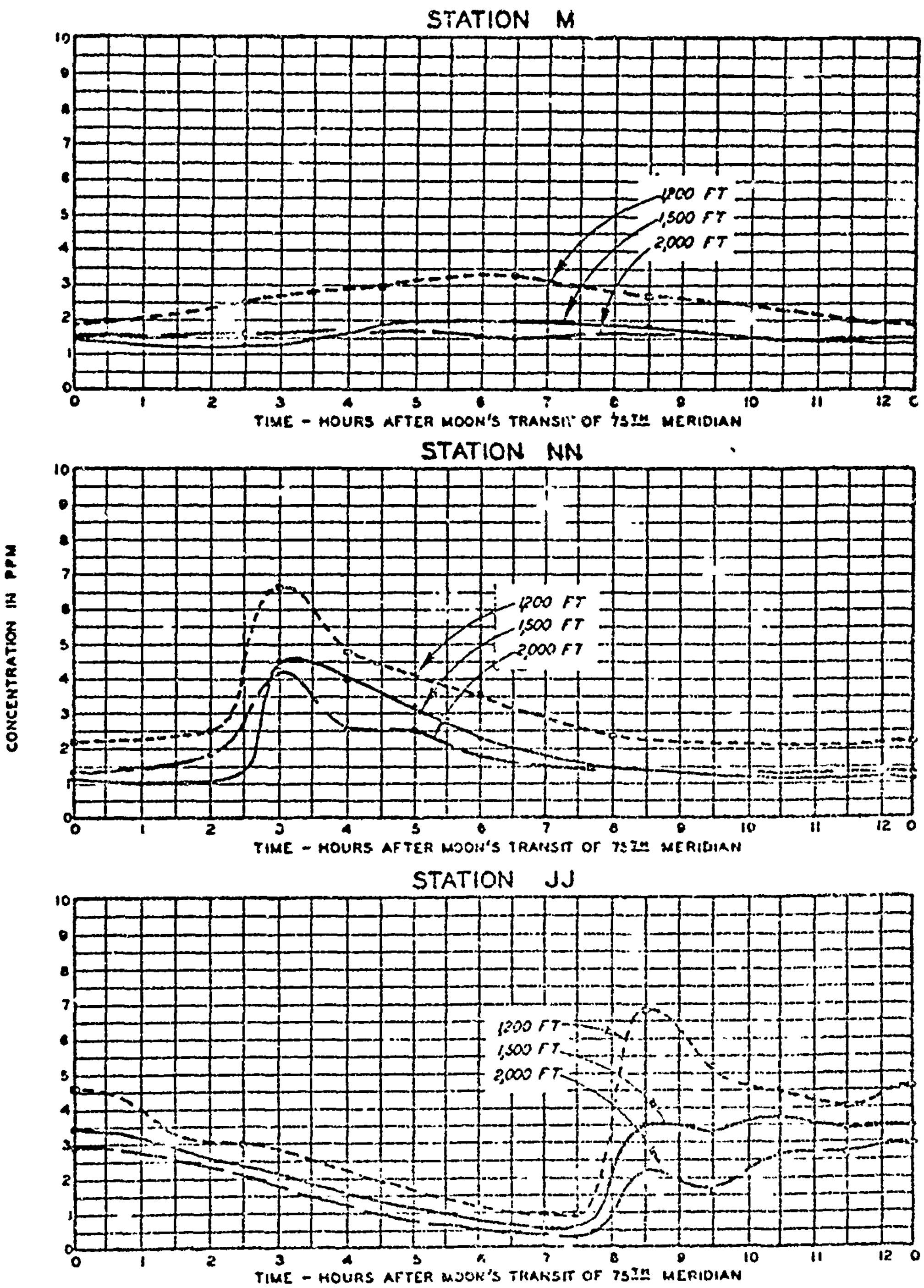
EFFLUENT CONCENTRATION
AT STATION 170+000
CARNEYS PO[illegible]T PLANT DISCHARGE



EFFECT OF PIPELINE LENGTH ON EFFLUENT DISTRIBUTION

DISCHARGE AT CARNEYS POINT PLANT

PLATE 15



LEGEND

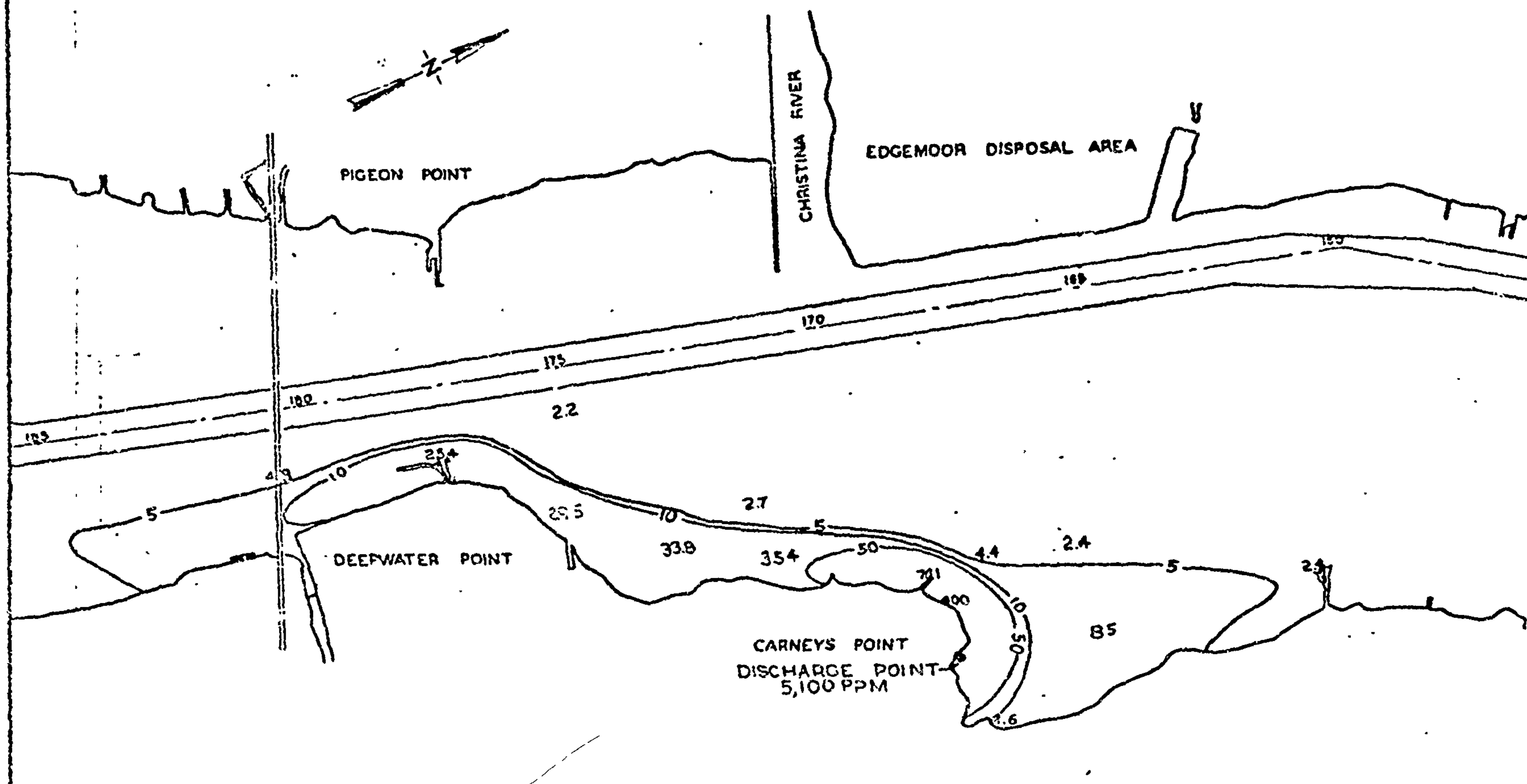
TEST	
9	●———●
10	o— — —o
11	o- - - - -o

NOTE: SEE TABLE ... R TE... CONDITIONS AND PLATE 2 FOR LOCA... SAMPLING STATIONS.

EFFECT OF PIPELINE LENGTH ON LOCAL CONCENTRATION THROUGHOUT A TIDAL CYCLE

DISCHARGE AT CARNEYS POINT PLANT

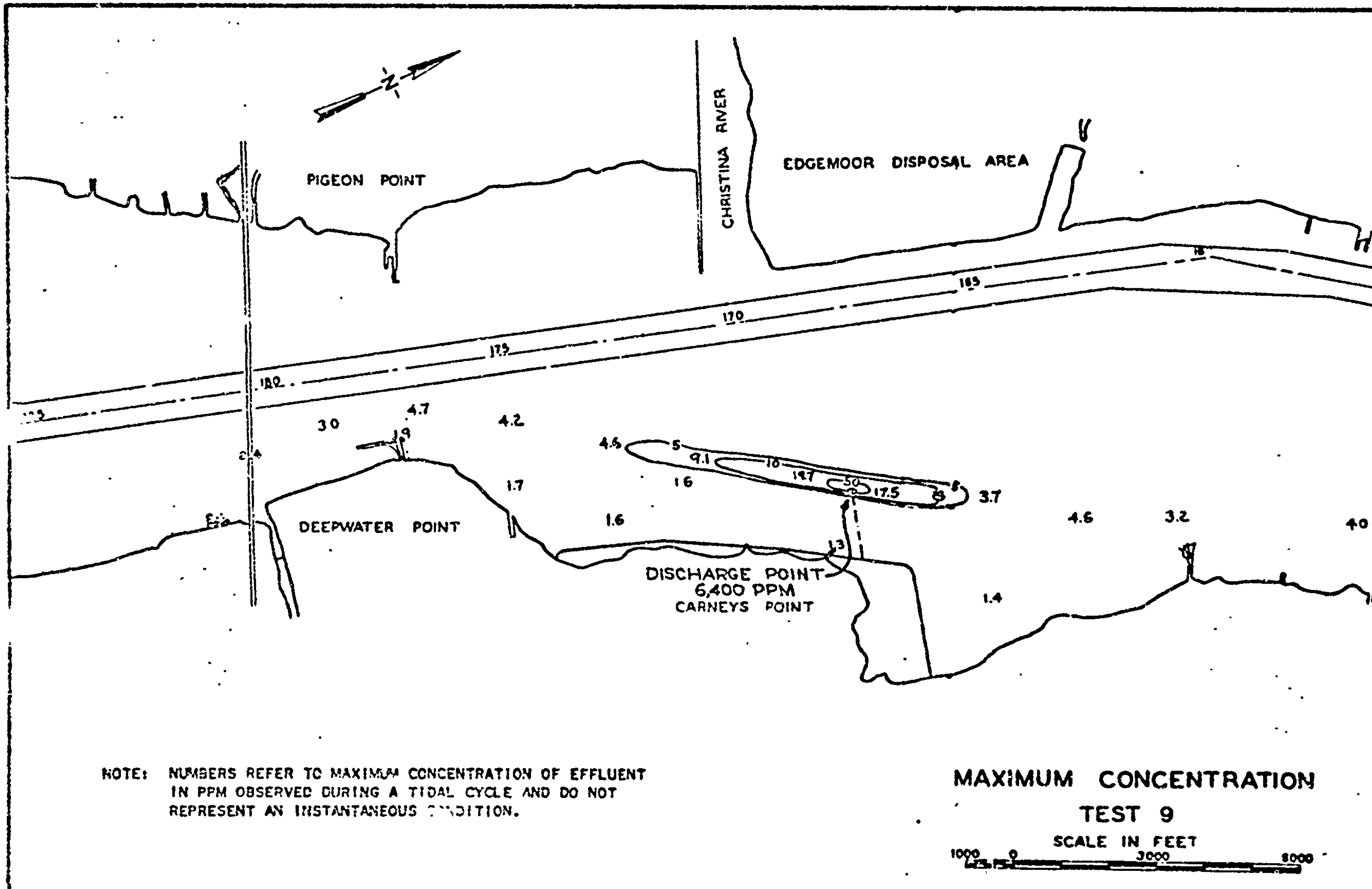
PLATE 10



NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 4

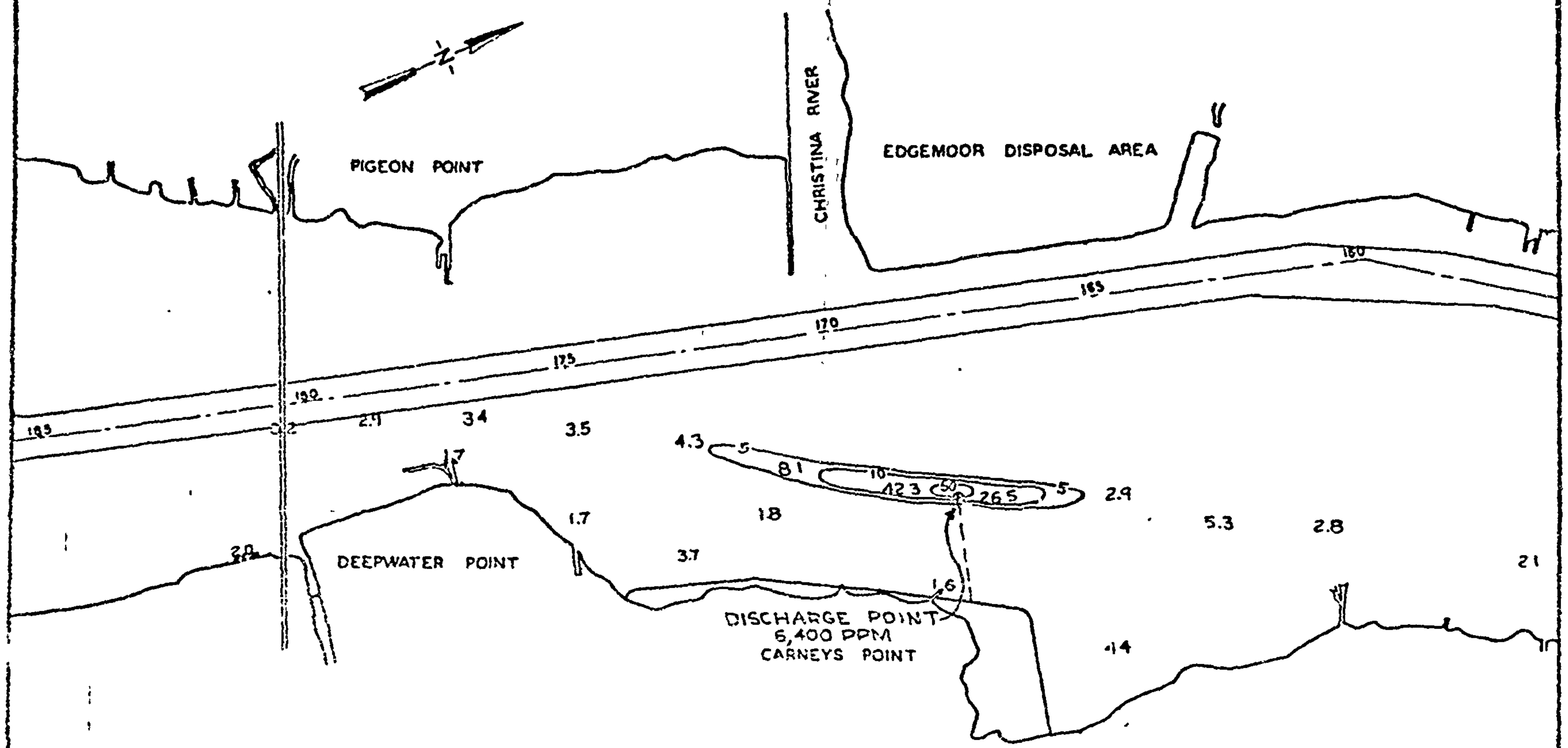
SCALE IN FEET
1000 0 3000 6000



NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 9

PLATE 18



NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

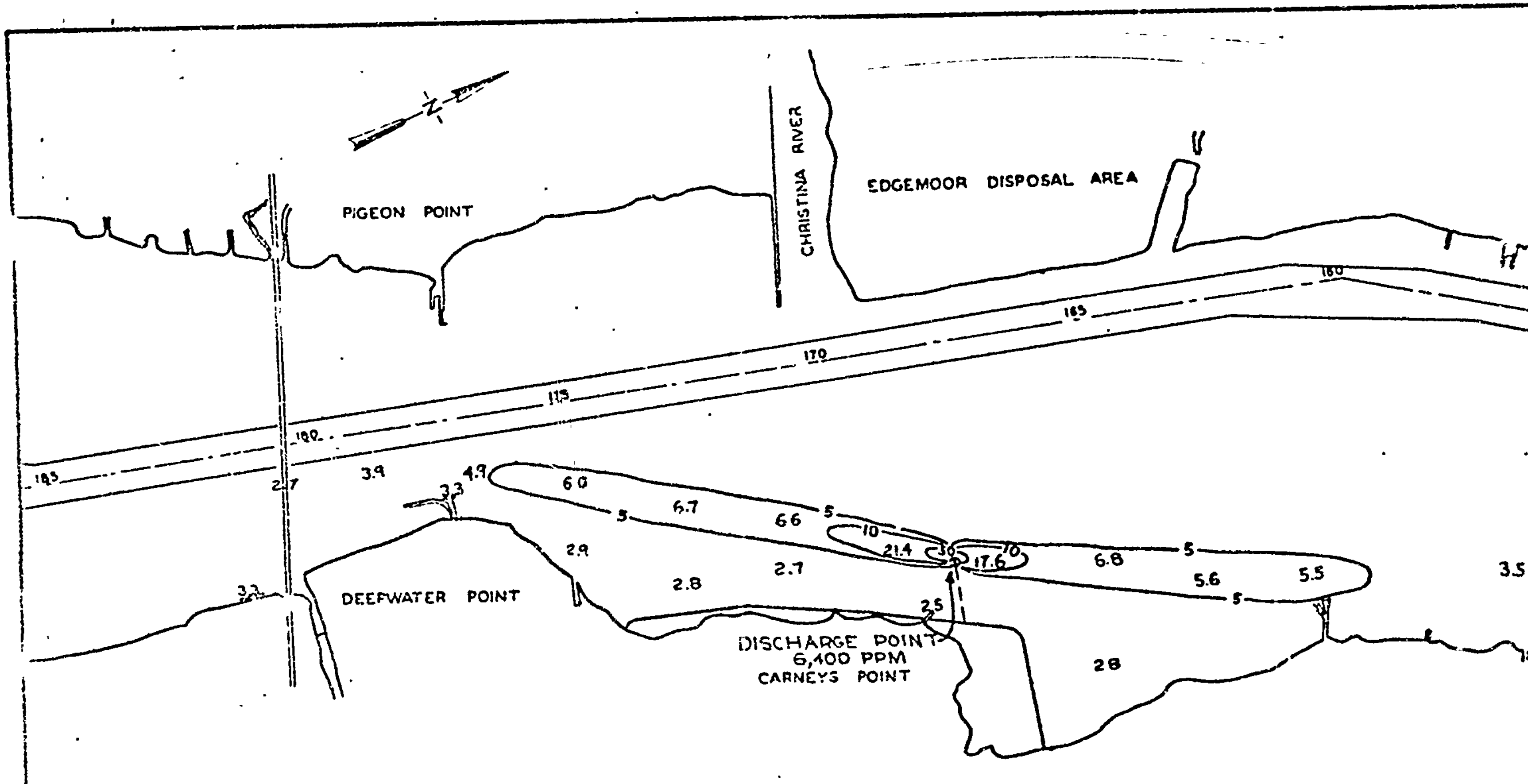
MAXIMUM CONCENTRATION

TEST 10

SCALE IN FEET

1000 0 3000 6000

PLATE 19

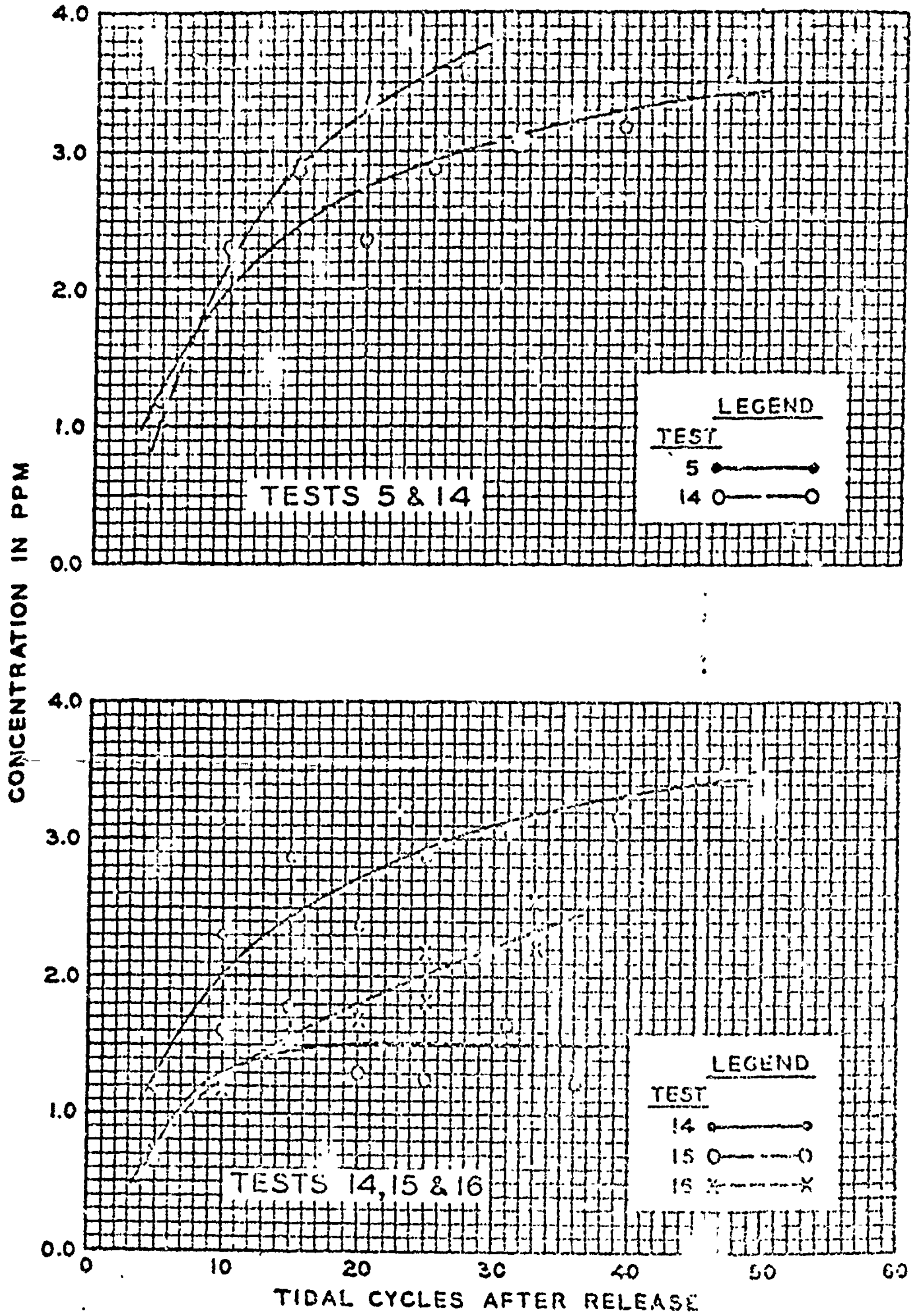


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 11

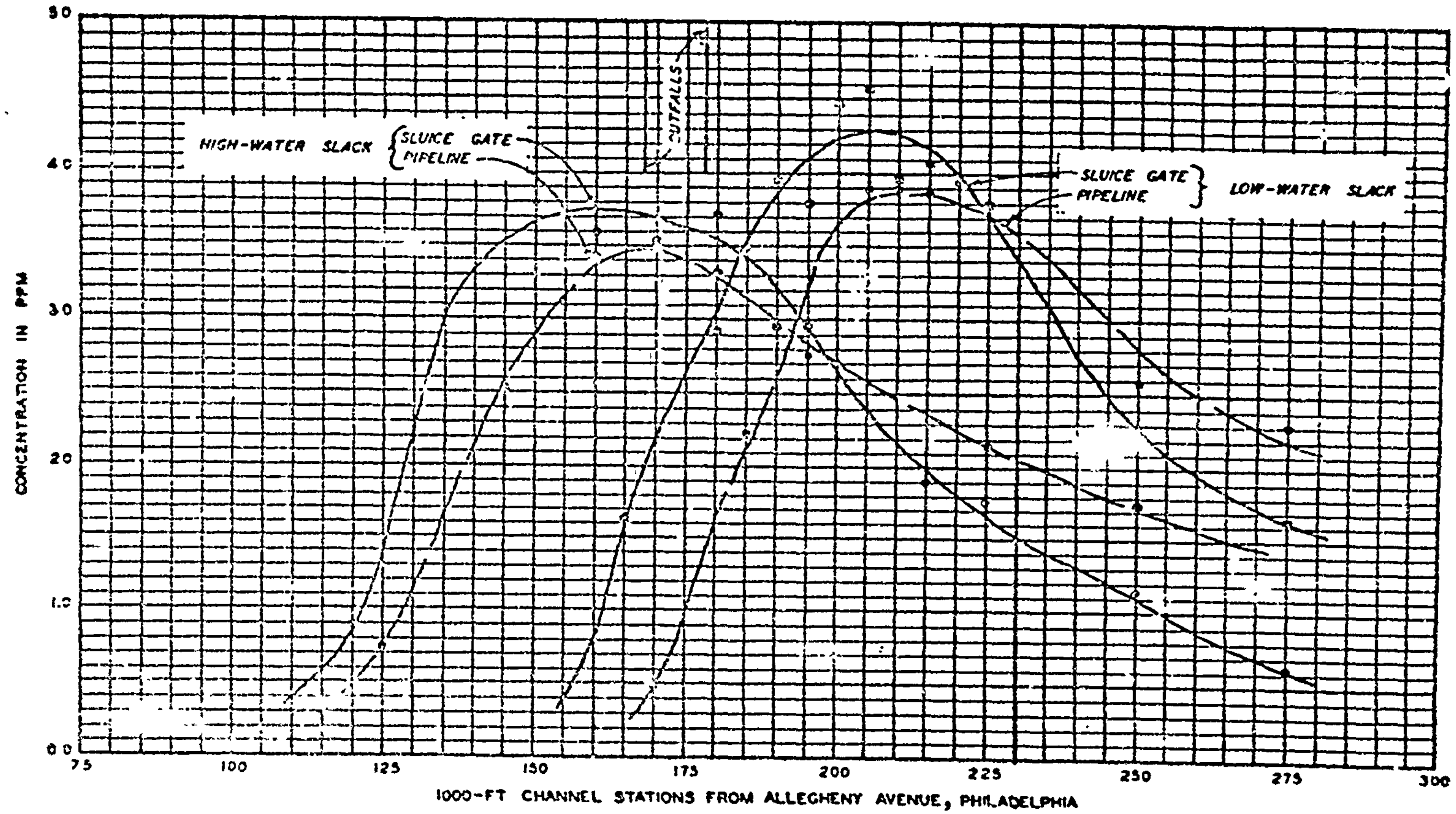
SCALE IN FEET
1000 0 3000 6000

PLATE 20



NOTE: SEE TABLE I FOR TEST CONDITIONS.
SAMPLES TAKEN AT HIGH-WATER SLACK.

EFFLUENT CONCENTRATION
AT STATION 170+000
DEEPWATER POINT AND CARNEY'S POINT PLANTS COMBINED DISCHARGES



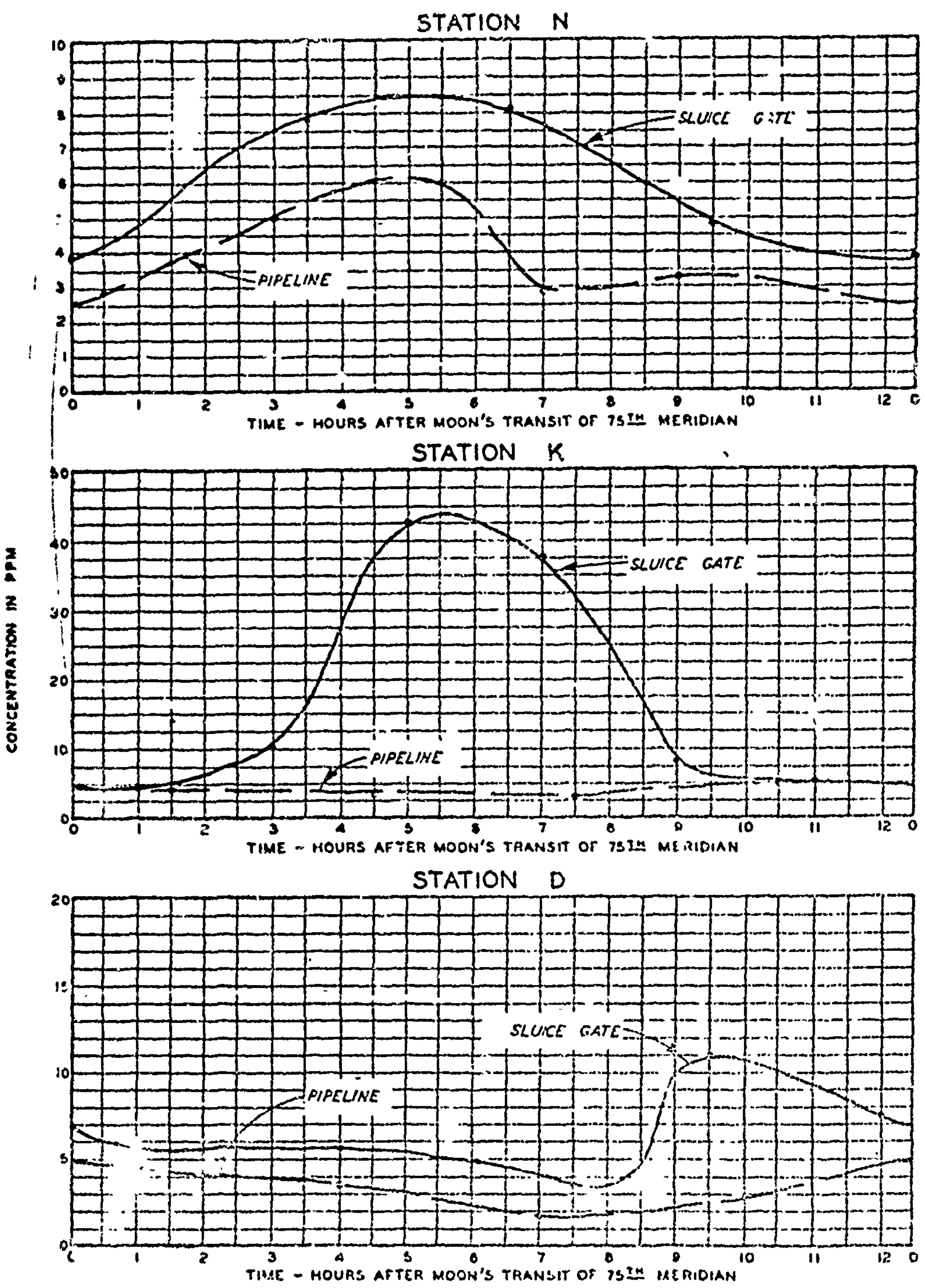
LEGEND

TEST	HIGH-WATER SLACK	LOW-WATER SLACK
5(BASE)	o———o	□———□
14	•——— ———•	□——— ———□

NOTE: SEE TABLE 7 FOR TEST CONDITIONS.

EFFECT OF MODE OF DISCHARGE ON EFFLUENT DISTRIBUTION

DISCHARGE AT BOTH PLANTS



LEGEND

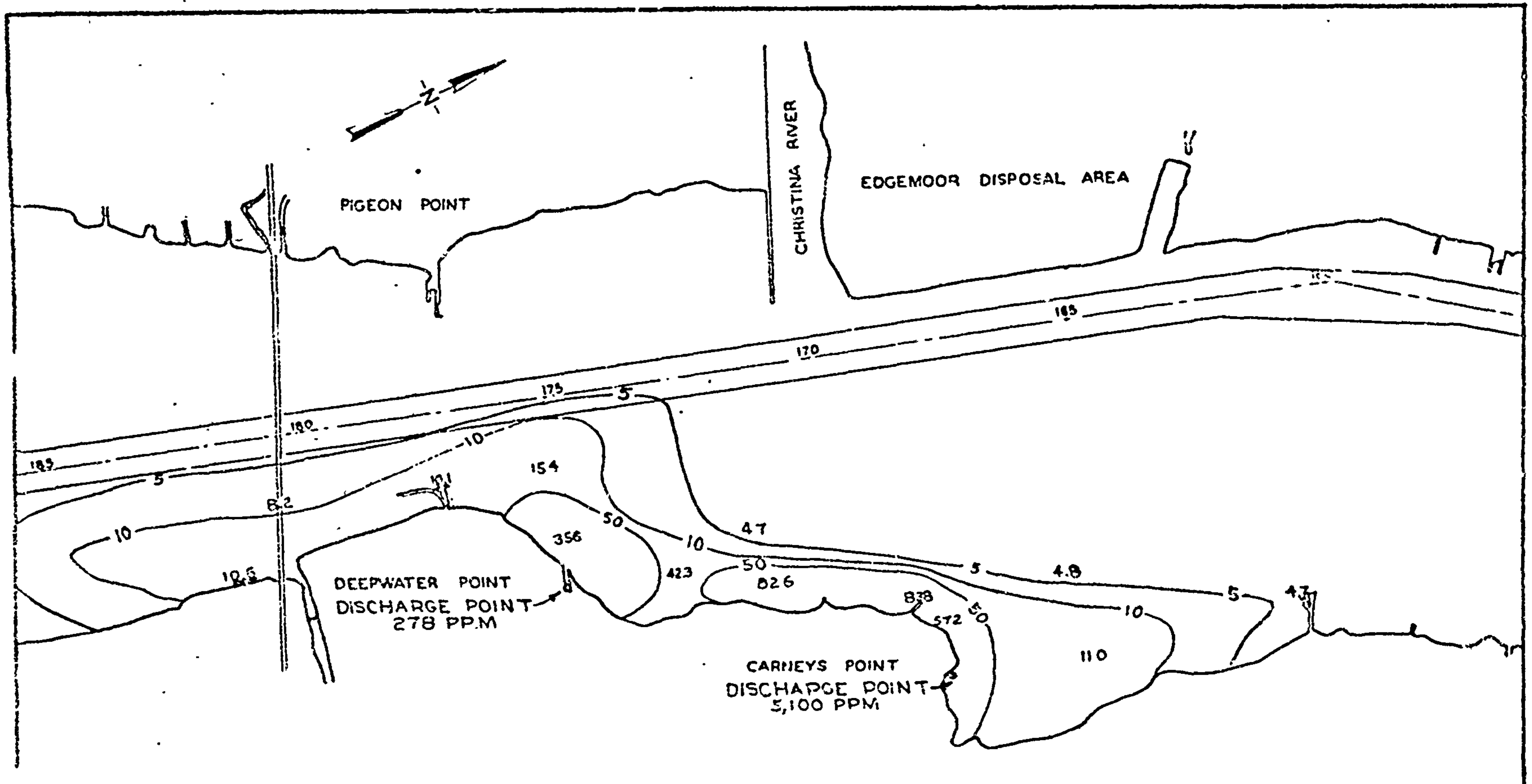
TEST
5 (BASE)
14

NOTE: SEE TABLE 1 FOR TEST CONDITIONS AND PLATE 2 FOR LOCATION OF SAMPLING STATIONS.

EFFECT OF MODE OF DISCHARGE ON LOCAL CONCENTRATION THROUGHOUT A TIDAL CYCLE

DISCHARGE AT BOTH PLANTS

PLATE 23

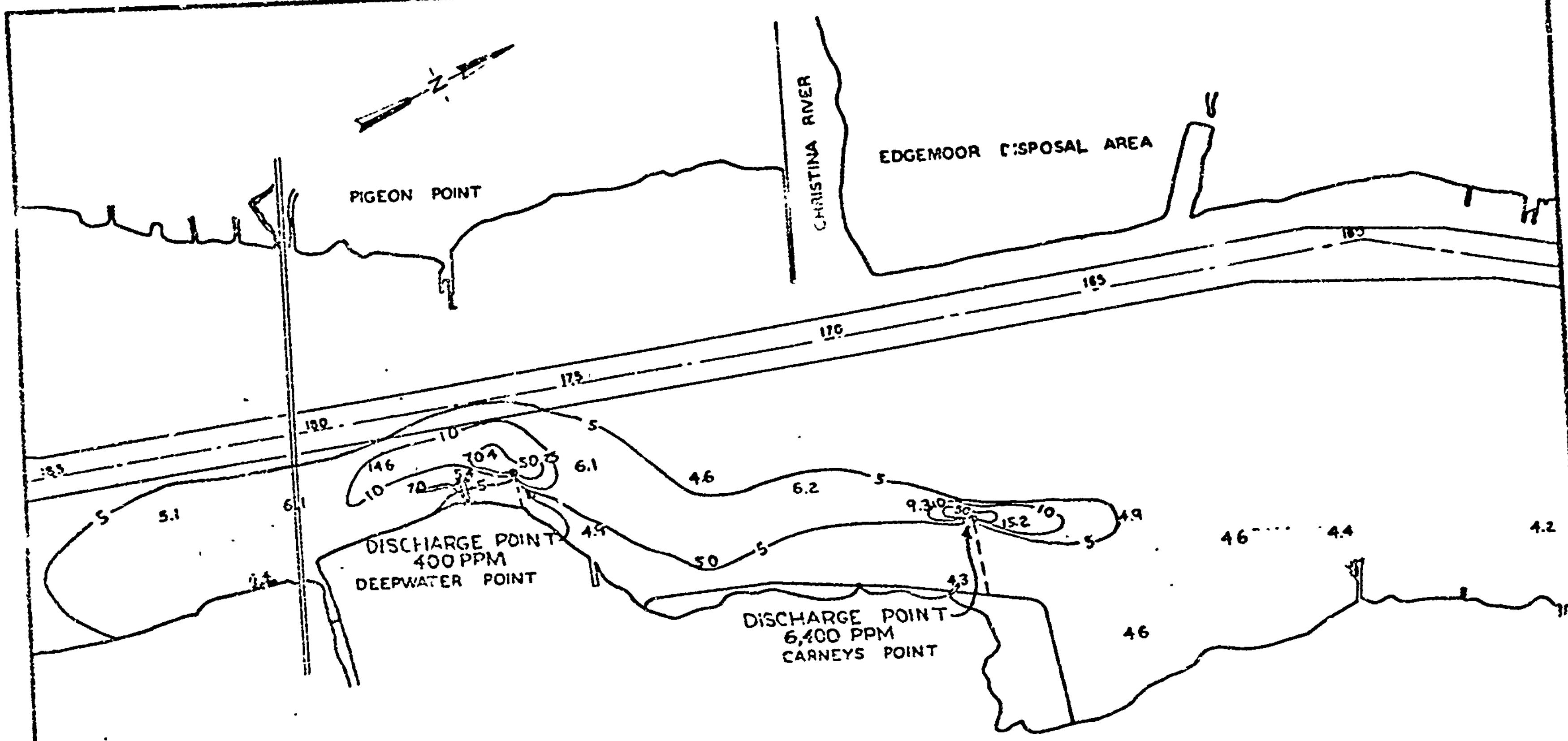


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION

MAXIMUM CONCENTRATION
TEST 5

SCALE IN FEET

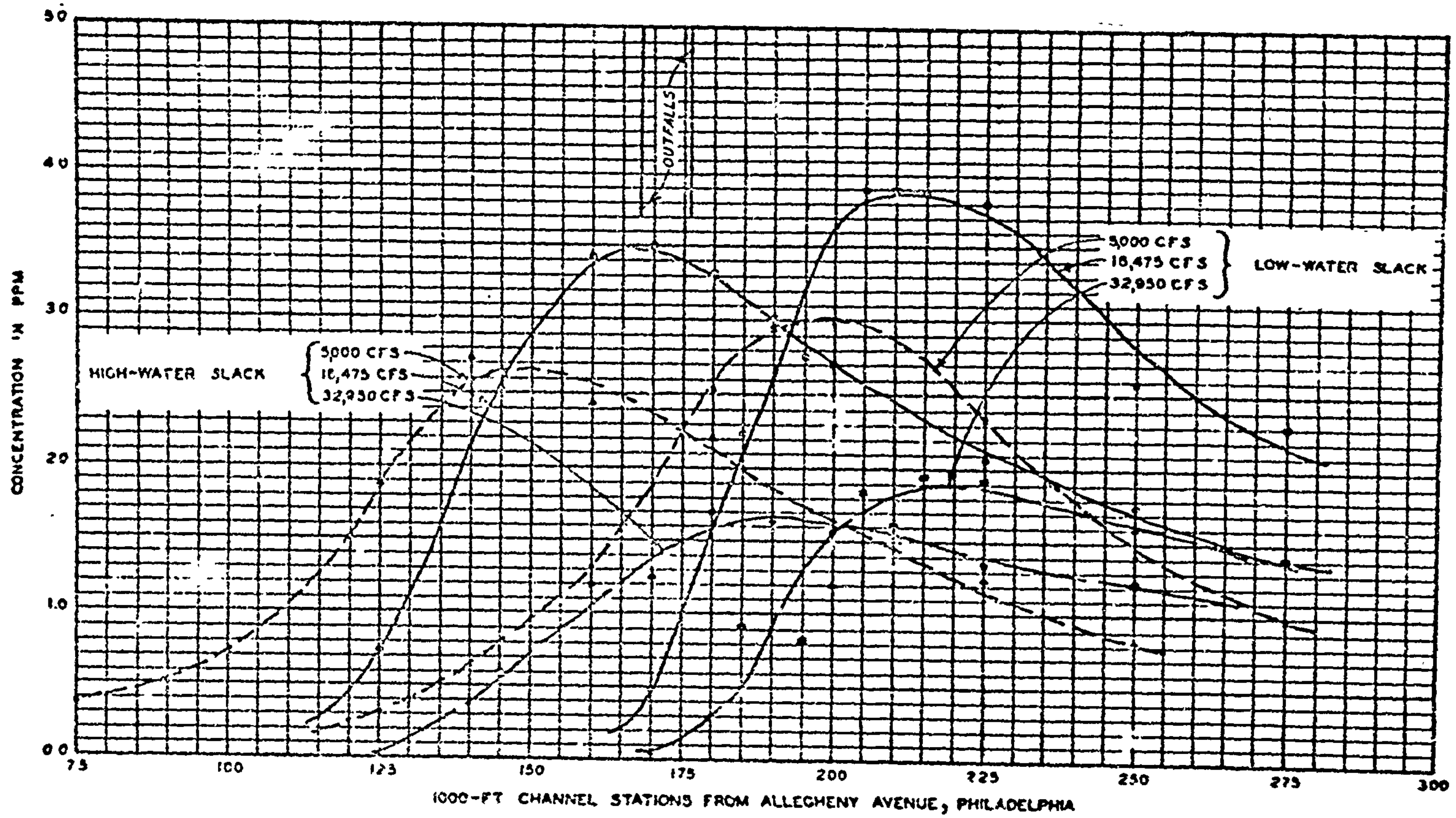
PLATE 24



MAXIMUM CONCENTRATION
TEST 14
SCALE IN FEET
1000 0 3000 6000

NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

PLATE 25

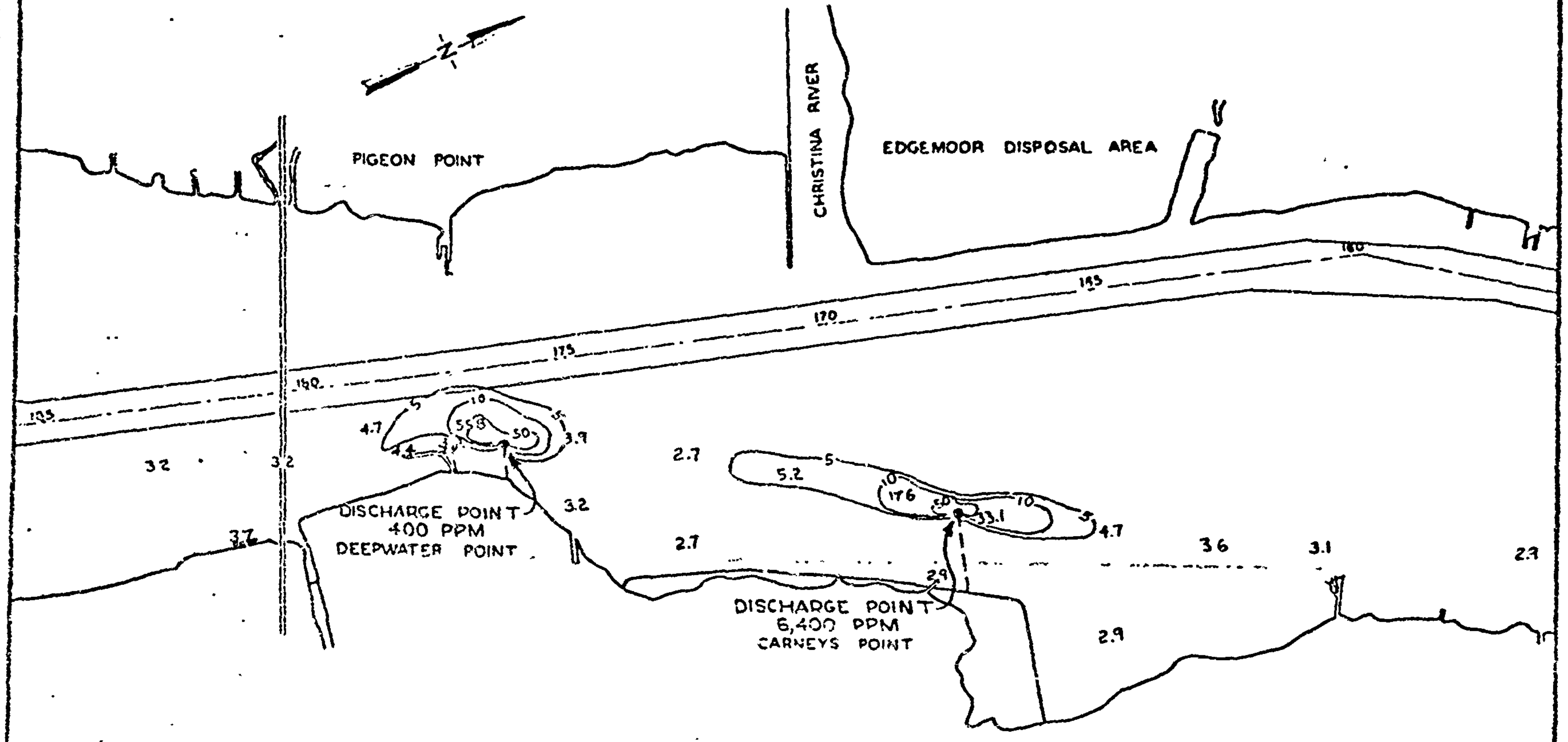


LEGEND

TEST	HIGH-WATER SLACK	LOW-WATER SLACK
14	o———————o	o———————o
15	•———— ————•	■———— ————■
16	△- - - - - - - -△	x- - - - - - - -x

NOTE: SEE TABLE 1 FOR TEST CONDITIONS.

EFFECT OF FRESH-WATER DISCHARGE ON EFFLUENT DISTRIBUTION
DISCHARGE AT BOTH PLANTS

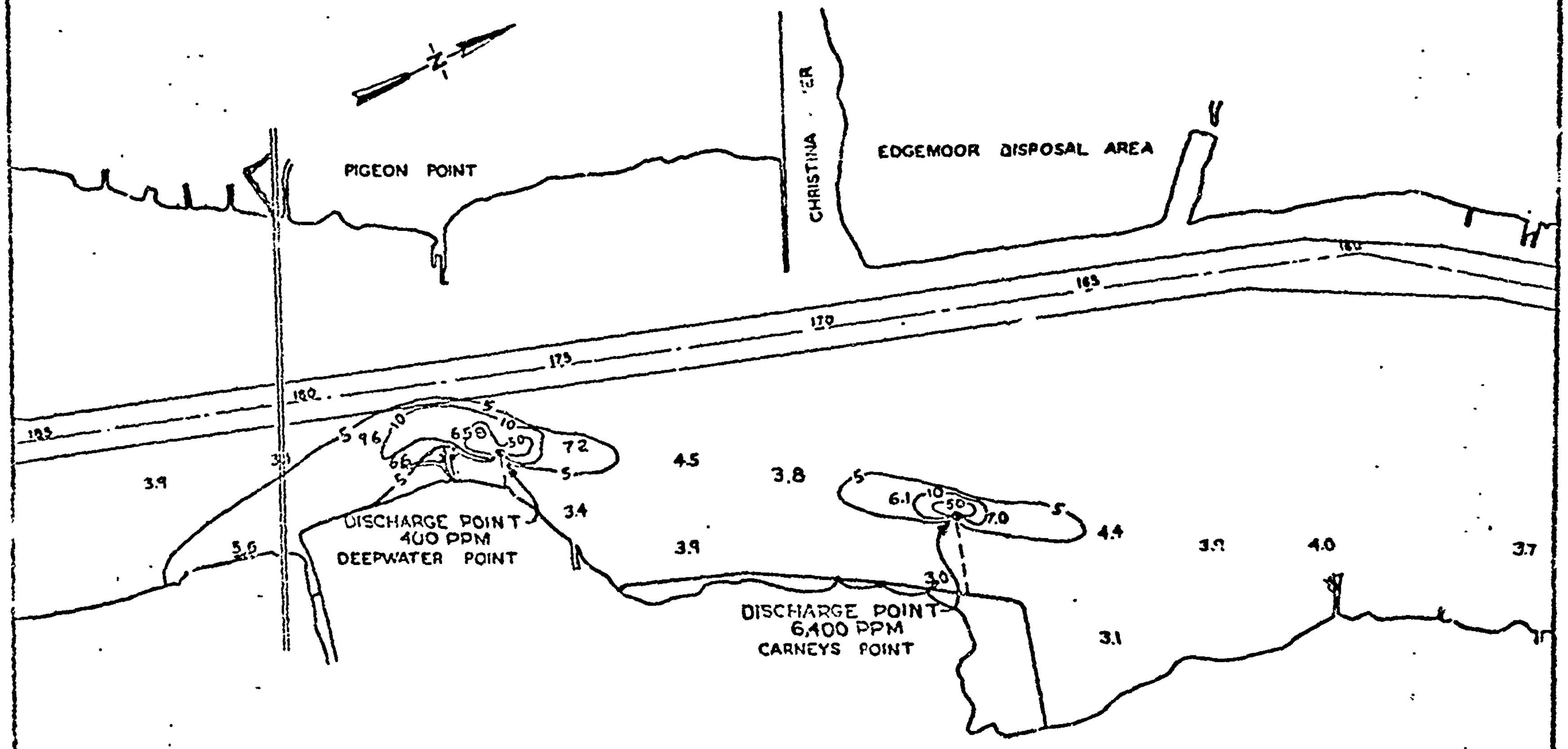


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 15

SCALE IN FEET
1000 0 2000 4000

PLATE 27

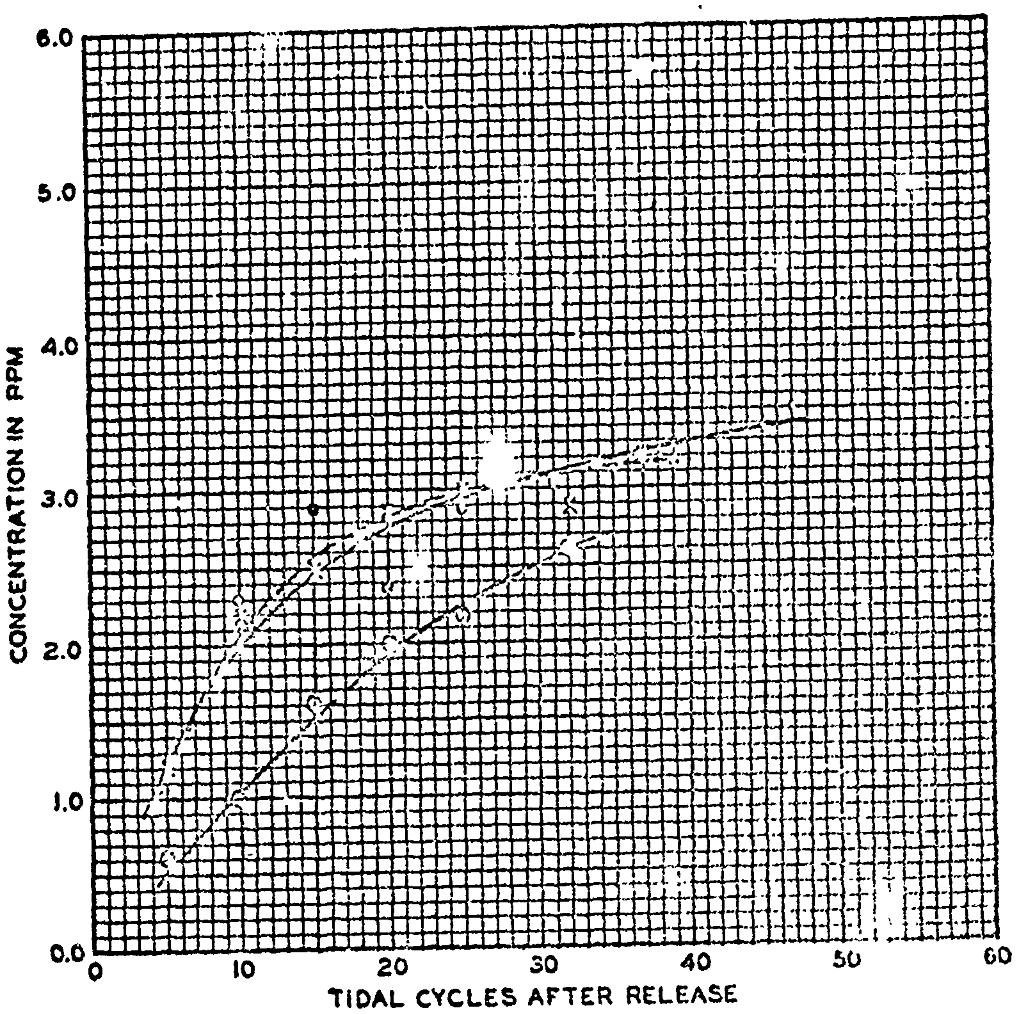


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 16

SCALE IN FEET

PLATE 28



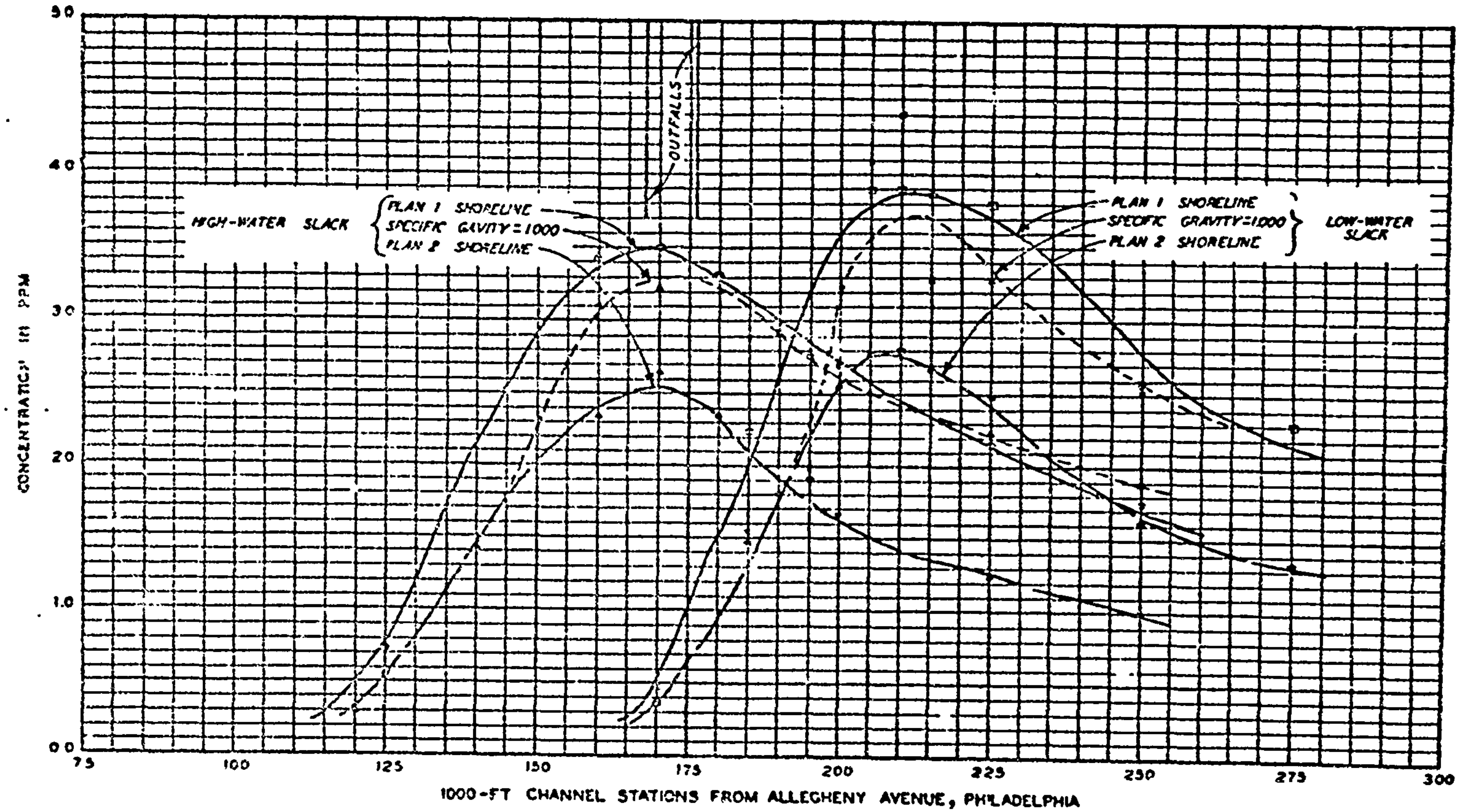
LEGEND

TEST	
14	●——●
17	O— —O
18	X- - - -X

NOTE: SEE TABLE I FOR TEST CONDITIONS
SAMPLES TAKEN AT HIGH-WATER SLACK

EFFLUENT CONCENTRATION
AT STATION 170+[illegible]00
TESTS 14, 17 AND 1[illegible]

PLATE. 29

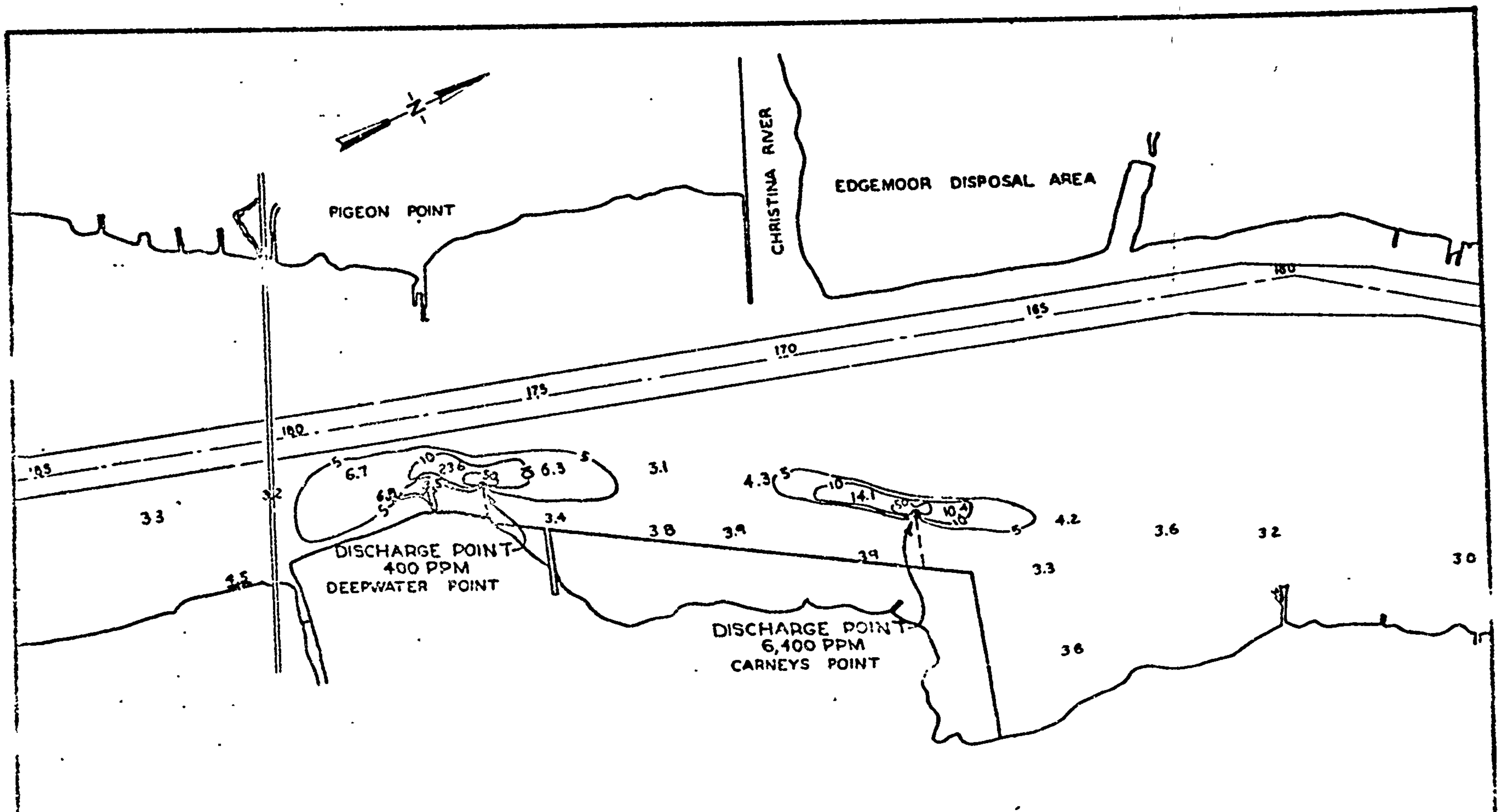


LEGEND

TEST	HIGH-WATER SLACK	LOW-WATER SLACK
14	o———————o	□———————□
17	●——— ———●	■——— ———■
18	△- - - - - - - -△	×- - - - - - - -×

NOTE: SEE TABLE 1 FOR TEST CONDITIONS.

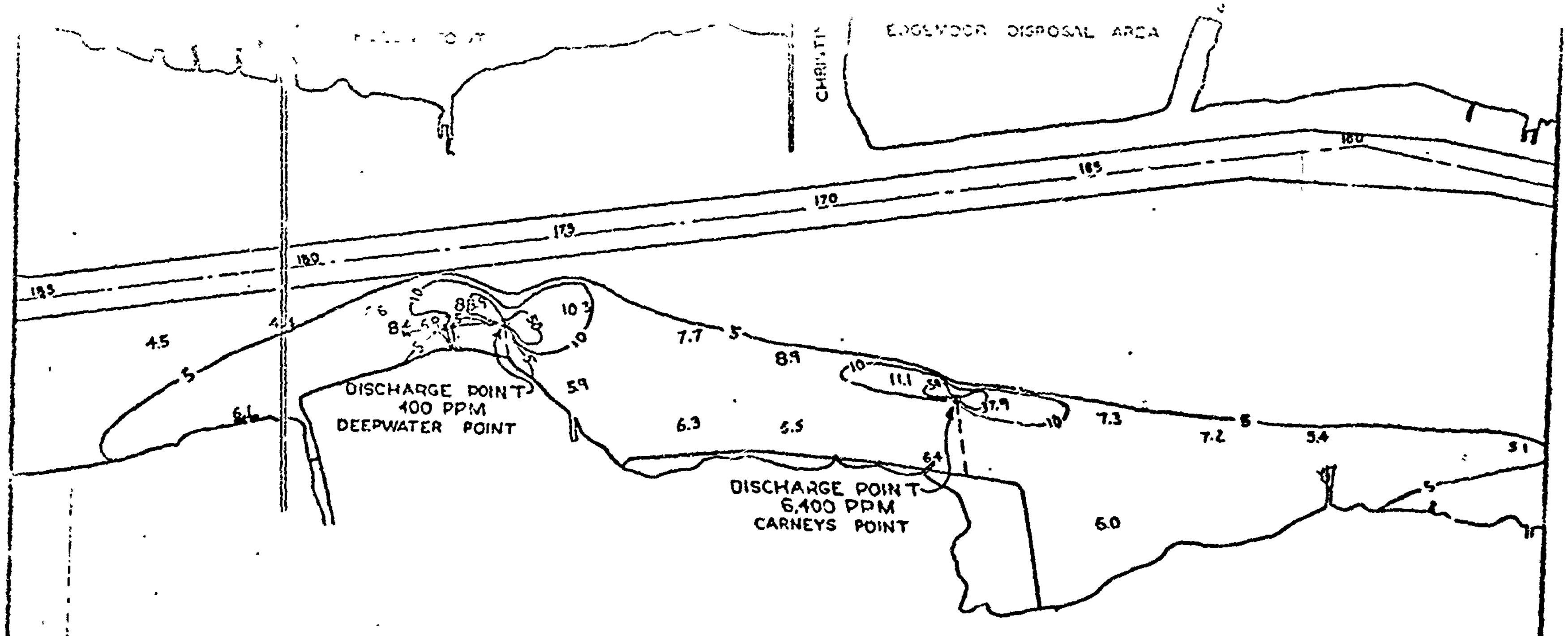
EFFECT OF PLAN 2 SHORELINE AND DECREASE IN DENSITY ON EFFLUENT DISTRIBUTION DISCHARGE AT BOTH PLANTS



MAXIMUM CONCENTRATION
TEST 17

NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

PLATE 31

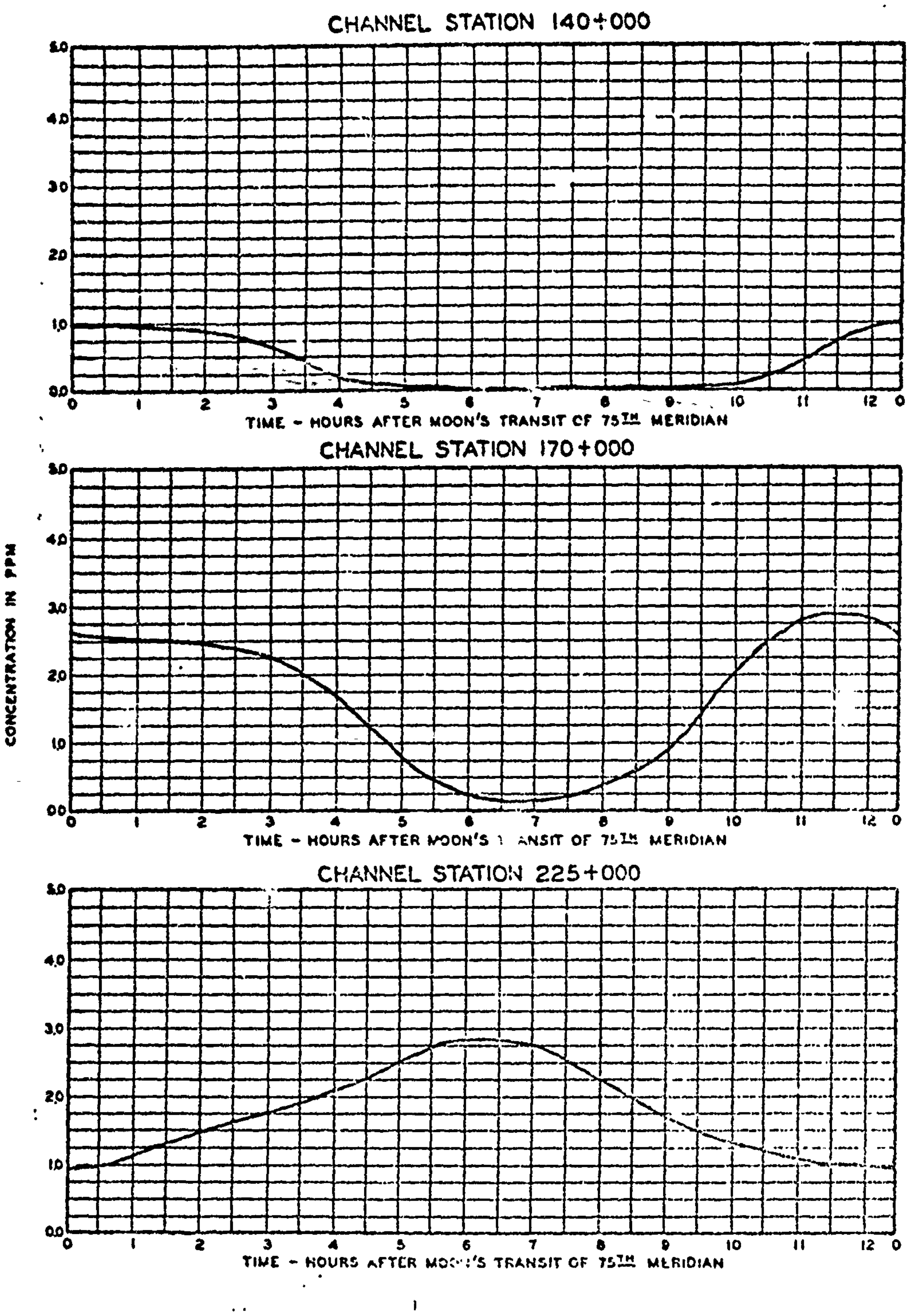


NOTE: NUMBERS REFER TO MAXIMUM CONCENTRATION OF EFFLUENT IN PPM OBSERVED DURING A TIDAL CYCLE AND DO NOT REPRESENT AN INSTANTANEOUS CONDITION.

MAXIMUM CONCENTRATION
TEST 18

SCALE IN FEET
1000 0 3000 6000

PLATE 32



NOTE: SAMPLES TAKEN 17 CYCLES AFTER BEGINNING OF RELEASE OF CONTAMINANT.

TYPICAL EFFLUENT CYCLES
TEST 18